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GRINDER, ELECTRIC
VALVE REFACER
WET-TYPE
INDEPENDENT PNEUMATIC
TOOL CO., THOR MODEL 100

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SAFETY PRECAUTIONS

Always wear safety glasses when operating the grinder.

Before starting the grinder, make sure the source to which it is connected is 110 volts.

Make sure there is a flow of coolant before grinding is started.

Make sure work is securely held before starting to grind.

Always take light cuts on the work.

Keep V-belts and electrical cords from contact with oil or coolant, as they will deteriorate.

CHAPTER 1

INTRODUCTION

Section I. GENERAL

1. Scope

a. These instructions are published for the information and guidance of the personnel to whom this grinder is issued. They contain information on the operation and organizational maintenance of the grinder as well as a description of the major units and their functions in relation to other components of the grinder. They apply only to the Independent Pneumatic Tool Company, Thor Model No. 100 grinder.

b. Other publications applicable to the equipment covered by this manual are listed in Appendix I, References. Appendix II, Identification of Replaceable Parts, tabulates the replaceable parts available for the equipment.

2. Record and Report Forms

Maintenance record forms listed and briefly described in *a* through *i* below will be used in the maintenance of this equipment.

a. *DD Form 6, Report of Damaged or Improper Shipment.* This form is used for reporting damages incurred in shipment.

b. *DD Form 110, Vehicle and Equipment Operational Record.* This form is used by equipment operators for reporting the accomplishment of daily preventive maintenance services and for reporting any equipment deficiencies observed during operation.

c. *DA Form 464, Work Sheet for Preventive Maintenance and Technical Inspection of Engineer Equipment.* This form is used by personnel of the using organization and higher echelons for reporting the results of preventive maintenance services and technical inspections.

d. *DA Form 460, Preventive Maintenance Roster.* This form is used for maintaining an operating time record on the item of equipment, and for scheduling lubrication and preventive maintenance services at proper intervals.

e. *DA Form 468, Unsatisfactory Equipment Report.* This form is used for reporting manufacturing, design, or operational de-

fects in the materiel, with the view to correcting such defects; it is also used for recommending modification of the materiel. Form 468 is not used for reporting failures, isolated materiel defects, or malfunctions of materiel resulting from fair wear and tear or accidental damage. Form 468 is not used to report the issue of parts and equipment, or for reporting replacements and/or repairs.

f. *DA Form 478, MWO and Major Unit Assembly Replacement Record, and Organizational Equipment File.* Major repairs or rebuilding, replacement of major unit assemblies, and accomplishment of equipment modifications are recorded on this form.

g. *DA Form 9-81, Exchange Part or Unit Identification Tag.* This form makes possible direct exchange of unserviceable for serviceable parts.

h. *DA Form 811, Work Request and Job Order.* This form is used to request work done by higher echelon organizations.

i. *DA Form 867, Status of Modification Work Order.* This form is used to maintain a record of all modification work performed on the equipment.

Section II. DESCRIPTION AND DATA

3. Description

a. *General Information.* The Model 100 electric valve refacing grinder (figs. 1 and 2) wet-grinds valve stems, faces, tappets, and rocker arms to predetermined dimensions. The grinder is

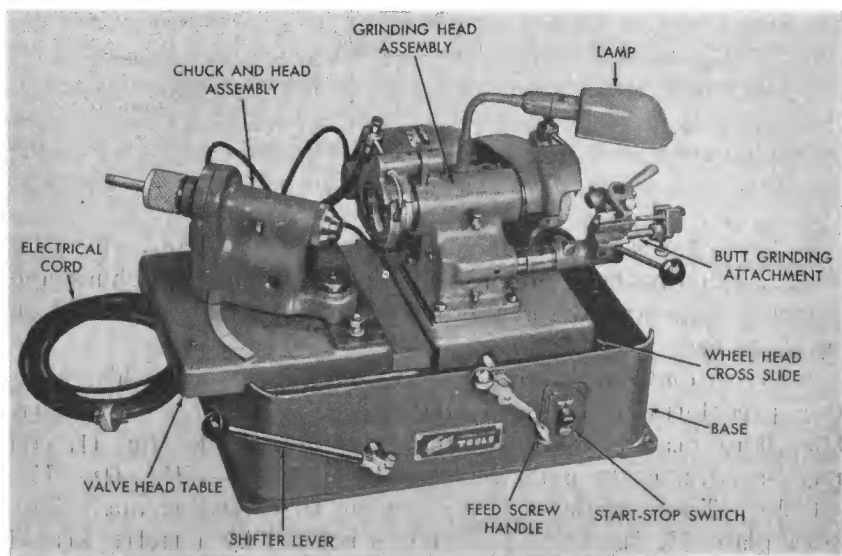
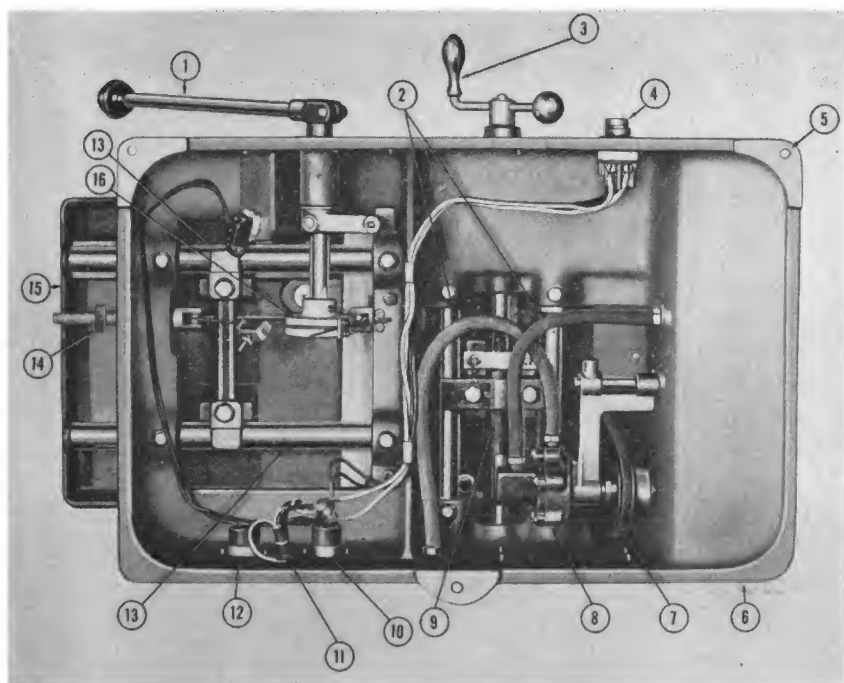


Figure 1. Model 100 electric valve refacing grinder.

powered by two universal ac or dc, 110-volt motors; one for the grinding head and one for the chuck head. The machine consists of the following major assemblies: base assembly, chuck and head assembly, and the grinding head assembly.



- | | |
|----------------------|-----------------------------------|
| 1 Shifter lever | 9 Feed screw |
| 2 Pump hose | 10 Grinding head motor receptacle |
| 3 Feed screw handle | 11 Lamp connection |
| 4 Start-stop switch | 12 Chuck head motor receptacle |
| 5 Mounting bolt hole | 13 Slide rod |
| 6 Base | 14 Valve head table stop nut |
| 7 Pump pulley | 15 Valve head table |
| 8 Coolant pump | 16 Shifter pulley |

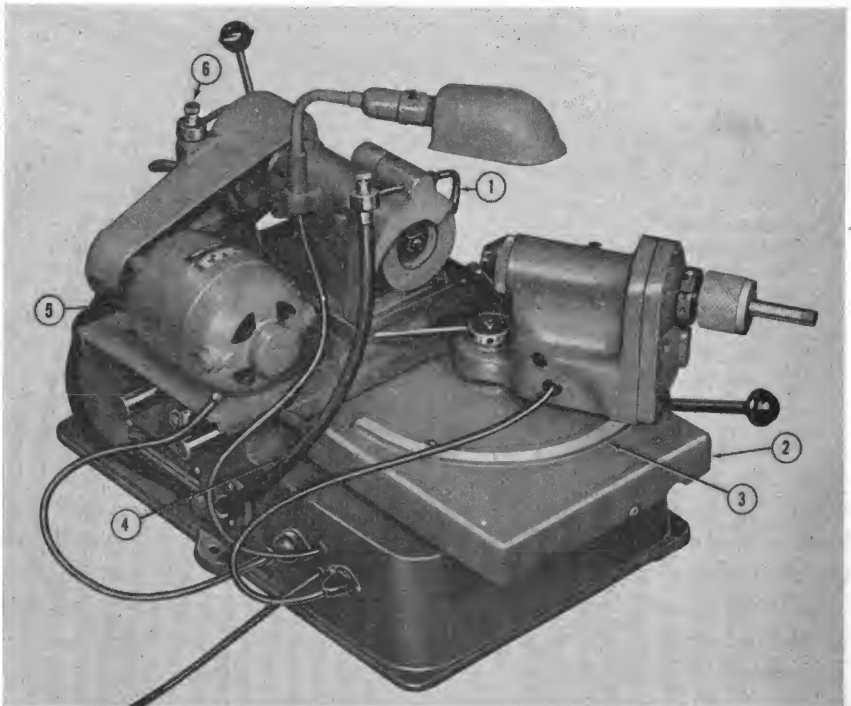
Figure 2. Bottom view of grinder.

b. Base Assembly. The base houses the controls, electrical wiring, grinding head motor, and coolant pump. The chuck and head assembly and the grinding head assembly are mounted on top of the base.

c. Chuck and Head Assembly (fig. 3). The chuck holds valves at a predetermined angle during the grinding of a valve face. The chuck head is hinged to the valve head table (fig. 1), and may be adjusted to grinding angles of 15°, 30°, 45°, 60°, 75°, and 90°. These angles are stamped on the grinding angle indicator plate (3, fig. 4). The chuck is rotated by a motor located in the chuck head.



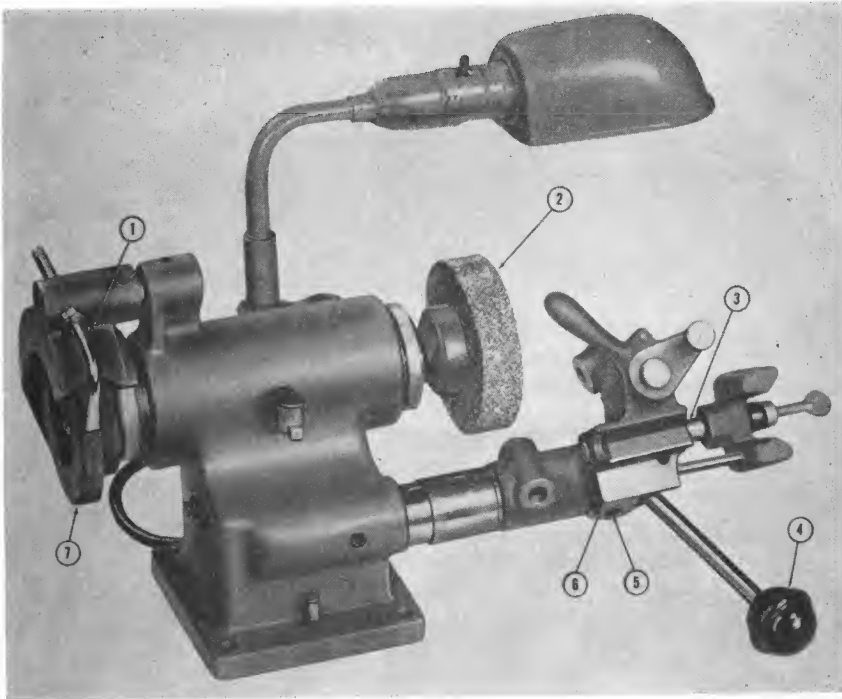
Figure 3. Chuck and head.



- | | |
|----------------------------------|-----------------------|
| 1 Coolant spout | 4 Coolant hose |
| 2 Valve head slide table | 5 Grinding head motor |
| 3 Grinding angle indicator plate | 6 Needle valve |

Figure 4. End view of grinder.

d. *Grinding Head Assembly* (fig. 5). The grinding head assembly is equipped with a grinding wheel at the chuck end and at the butt end. The chuck end wheel (7) is used for valve face grinding, and the butt end wheel (2) is used for valve stem, tappet, and rocker arm grinding.



- | | |
|----------------------------|----------------------|
| 1 Coolant spout | 4 V-block arm handle |
| 2 Butt end grinding wheel | 5 Drilled hole |
| 3 Butt grinding attachment | 6 V-block arm |
| 7 Chuck end grinding wheel | |

Figure 5. Grinding head with butt grinding attachment.

e. *Accessories*. The accessories (fig. 6) used for the different operations are the butt grinding attachment, rocker arm grinding attachment (fig. 7), V-blocks, bracket and diamond holder, dressing diamond, and the depth gage. These accessories are used separately or in combination to perform specific operations.

4. Identification

The Model 100 valve refacer is identified by the name and serial number plate (A, fig. 8) at the rear of the base. The grinding head motor name plate (B, fig. 8), and the chuck head motor name plate (C, fig. 8), are located on top of the respective motors. When ordering parts or referring to this equipment, always give the name and serial numbers shown on these name plates.

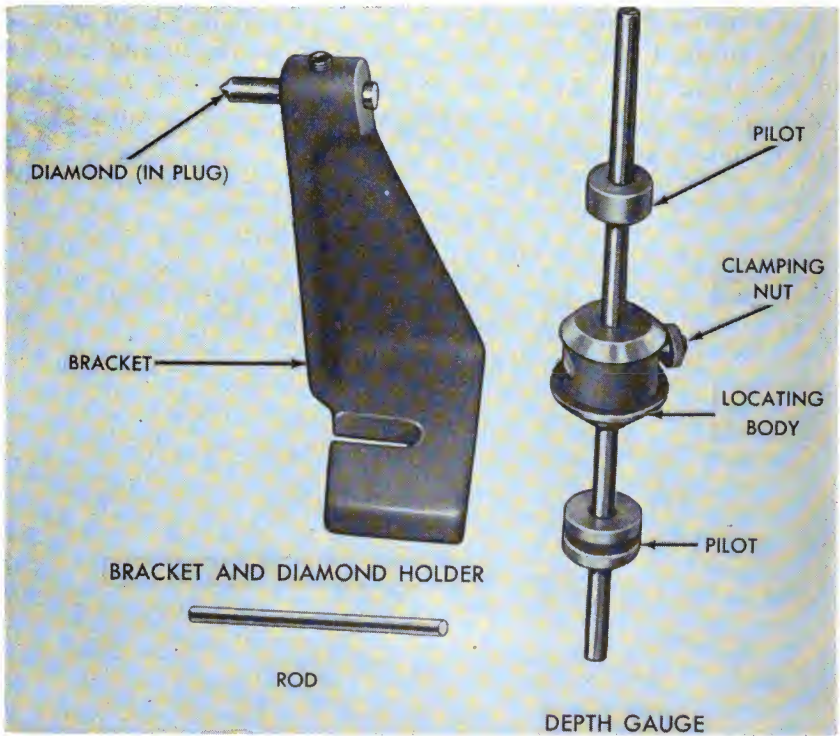
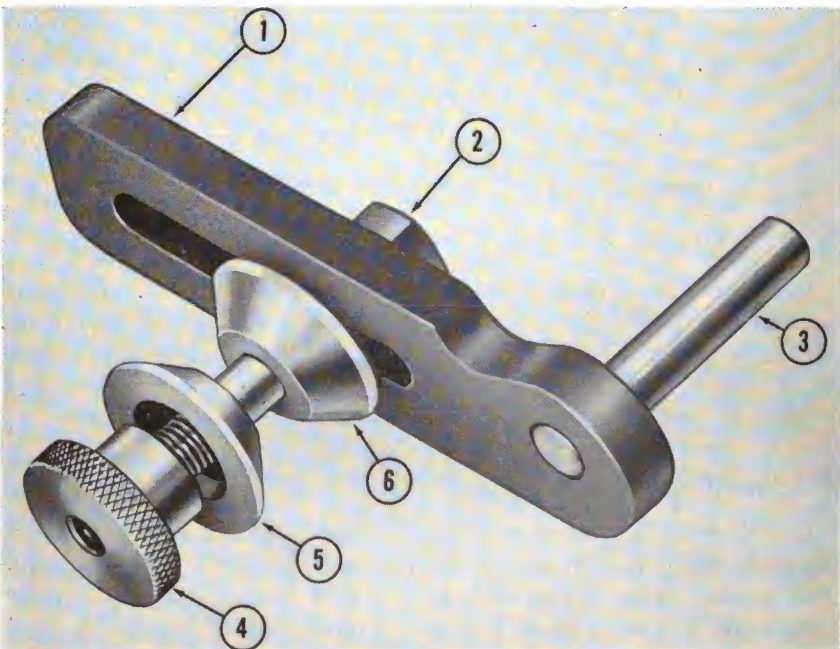


Figure 6. Valve grinding machine accessories.

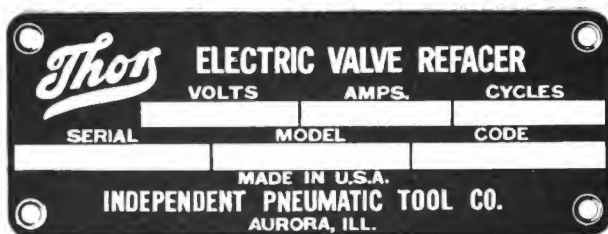


- 1 Plate
2 Clamp nut

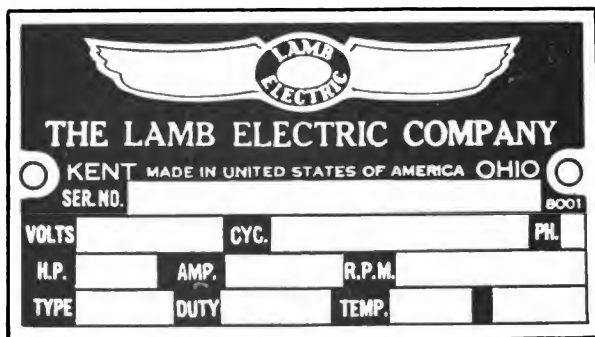
- 3 Attachment pin
4 Knurled nut

- 5 Cone washer
6 Stud

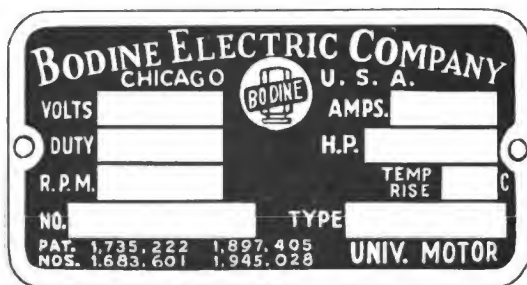
Figure 7. Rocker arm grinding attachment.



A



B



C

A Grinder Identification plate

B Grinding head motor name plate

C Chuck head motor name plate

Figure 8. Name and serial number plates.

5. Tabulated Data

a. General.

(1) Overall dimensions.

(a) Length	24 in.
(b) Width	16 in.
(c) Height	16½ in.
(d) Net weight	255 lbs.
(e) Shipping weight	290 lbs.

(2) *Mounting dimensions.*

Two $1\frac{1}{32}$ -inch holes in front base, $23\frac{1}{8}$ inches between centers.

One $1\frac{1}{32}$ -inch hole in center of back base.

b. Performance.

(1) *Chuck.*

(a) Type: collet.

(b) Maximum valve face capacity $3\frac{1}{2}$ -inch valve.

(c) Speed: 250 rpm.

(2) *Valve grinding angles:* 15° , 30° , 45° , 60° , 75° , 90° .

(3) *Motors.*

(a) Chuck head: Bodine Electric Company, $1/30$ hp, 3,300 rpm, 110-V universal ac or dc.

(b) Grinding head: Lamb Electric Company, $1/3$ hp, 6,000 rpm, 110-V universal ac or dc.

(4) *Grinding wheel speed:* 5,500 rpm.

c. Coolant, Tank Capacity. 1 gallon.

CHAPTER 2

OPERATING INSTRUCTIONS

Section I. SERVICE UPON RECEIPT OF EQUIPMENT

6. New Equipment

a. Unpacking. The grinder and its accessories are packed in a steel strapped wooden crate. Make sure the crate is right side up, then cut the steel strapping and remove the top of the crate. Pry away the wooden supports which hold the grinder, then raise it out of the crate and place it on a solid base.

b. Removal of Protective Material. Remove the paper wrapping from the grinder accessories and clean the grinder with a clean cloth.

c. Damage Check. Carefully inspect the grinder and accessories for damage. Inspect the coolant hoses and electrical connections to make sure they are tight. Move the shifter lever and the feed screw handle to make sure they operate easily. Check all V-belts to make sure they are correctly positioned on the pulleys. Rotate the grinding wheels by hand to make sure they turn freely.

d. Assembly for Use. The grinder is shipped completely assembled, but it is necessary to place the lamp in the hole provided in the grinding head assembly, screw on the lampshade, and install a bulb. It is also necessary to fasten on any attachments which are to be used.

e. Lubrication.

- (1) Give the grinder a complete before-operation service (par. 24c).
- (2) Give the grinder a complete lubrication as specified in LO 5-4193.

f. Setting-Up Instructions.

- (1) Place the grinder on a solid wooden table so that it is about waist high.
- (2) Using the bolt holes (5, fig. 2) in the base of the grinder as a guide, drill three $1\frac{1}{32}$ -inch holes through the table.
- (3) Install bolts through these holes and secure the grinder to the table with washers and nuts.

- (4) In a separate container, prepare one gallon of coolant solution. To do this, add enough warm water to the cutting oil to make a gallon of coolant. Stir until completely mixed.
- (5) Pour the coolant solution into the coolant tank at the right of the grinding head assembly. This will completely fill the tank.

g. Installation.

- (1) Make sure the start-stop switch is in the "off" position.
- (2) Check to make sure the electrical outlet supplies 110 volts.
- (3) Insert the electrical plug of the grinder into the 110 source.

7. Used Equipment

Since used equipment is more likely to be damaged than new equipment, inspect the unit carefully upon receipt. Then follow all procedures given in paragraph 6.

Section II. CONTROLS

8. General

This section describes, locates, illustrates, and furnishes the operator sufficient information about the various controls and instruments for the proper operation of the grinder.

9. Controls

a. Shifter Lever. The shifter lever (fig. 1) located at the front of the machine, on the operator's left, moves the valve head table toward and away from the chuck end grinding wheel. Moving the shifter lever to the right moves the valve head table toward the grinding head; moving the lever to the left moves the valve head table away from the grinding head.

b. Feed Screw Handle. The feed screw handle (fig. 1) located at the front of the machine, on the operator's right, moves the wheel head cross slide, which supports the grinding head assembly, toward the front or rear of the machine. Turning the handle clockwise moves the cross slide toward the rear of the machine (away from the operator). Turning the handle counterclockwise moves the cross slide toward the front of the machine (toward the operator).

c. Start-Stop Switch (fig. 1). The start-stop switch located at the front of the machine, at the operator's right, turns the grinder on and off.

d. V-Block Arm Handle (fig. 5). The V-block arm handle (4), located on the operator's right, is used to move the butt grinding attachment (3) across the side of the butt end grinding wheel.

e. Grinding Angle Indicator Plate (fig. 4). The grinding angle indicator plate (3) stamped on top of the valve head table (2), shows in degrees the angle at which the chuck is set to the grinding head assembly.

f. Micrometer Feed Nut (fig. 10). The micrometer feed nut (3), which is used to make fine adjustments, moves the butt end grinding attachment close to and away from the face of the butt end grinding wheel.

Section III. OPERATION UNDER USUAL CONDITIONS

10. General

a. The instructions in this section are published for the information and guidance of the personnel responsible for the operation of this grinder.

b. It is essential that the operator know how to perform every operation of which the grinder is capable. This section gives instructions on starting and stopping the grinder, basic motions of the grinder, and how to coordinate the basic motions to perform the specific tasks for which the grinder is designed. Since nearly every job presents a different problem, the operator may have to vary the given procedure to fit the individual job.

11. Starting and Stopping

a. General. Before starting, perform the before-operations inspection and services (par. 24c).

b. Starting.

Caution: Before starting, make sure the electrical source to which the grinder is connected is 110-volt ac or dc.

- (1) Press the start button on the start-stop switch. This starts the grinding head motor, and rotates the grinding wheels.
- (2) Move the shifter lever to the right. This automatically starts the chuck head motor and rotates the chuck.

c. Stopping.

- (1) Move the shifter lever to the extreme left. This automatically stops the chuck head motor.
- (2) Press the stop button on the start-stop switch. This stops the grinding head motor, and shuts off the machine.
- (3) Perform the complete after-operation inspection and services (par. 24f).

12. General Operation Details

Caution: Before operating the machine, the operator should put on a pair of protective goggles to protect his eyes.

a. Priming Coolant Pump. If the coolant pump reservoir has been completely filled (par. 6f(4) and (5)), the pump is self-priming. If the pump becomes air bound, it can be primed in any of the following ways:

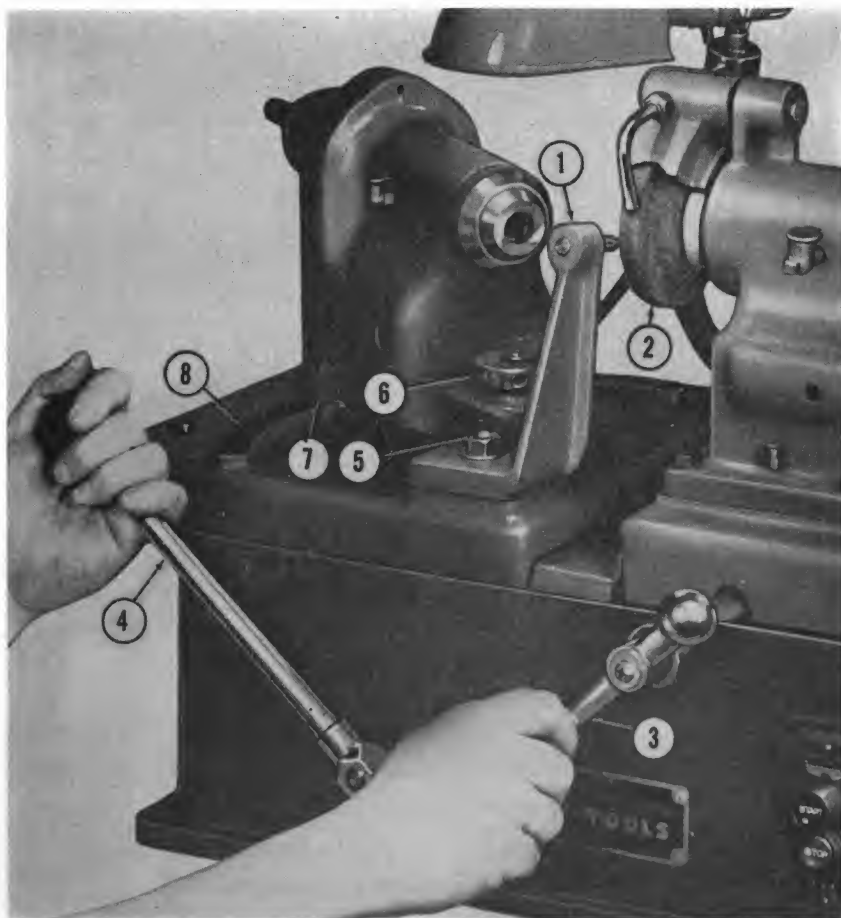
- (1) Remove one of the needle valves (6, fig. 4) and press the thumb repeatedly against the outlet hole. This exerts a plunger-type pressure.
- (2) Gently blow a jet of compressed air against the top of the needle valve opening.
- (3) Apply suction to the top of the needle valve opening.

b. Dressing Chuck End Grinding Wheel (fig. 9).

- (1) Mount the bracket and diamond holder (1), with the diamond inserted and clamped, on the stud (5) at the front of the valve head table. Tighten the washer and nut on the stud.
- (2) Press the start button on the start-stop switch. This starts the grinding head motor. Make sure coolant is being pumped. If there is no coolant flow, prime pump; see *a* above.
- (3) Move shifter lever (4) slowly to the right until the diamond is in line with the center of the grinding wheel face (2).
- (4) Turn the feed screw handle (3) slowly counterclockwise to bring the grinding wheel up to the diamond. Move the diamond rapidly back and forth across the grinding wheel face with the shifter lever (moving the diamond slowly tends to glaze the wheel). After each complete pass of the diamond (across the wheel, then back to the starting point), move the grinding wheel forward slightly with the feed screw handle.
- (5) Repeat, taking light cuts, until the face of the wheel is dressed true and clean. Shut off the grinder.

- (6) Remove the nut and washer from the stud (5), remove the bracket and diamond holder from the valve head table, and replace the washer and nut on the stud.

Note. In case 90° or flat valves (which are rarely used) are to be ground, it is necessary to use a special diamond holder in order to true the inside of the wheel. In this case, the shifter lever controls the depth of cut, and the feed screw handle is used to pass the diamond across the wheel.



- | | |
|------------------------------|----------------------------------|
| 1 Bracket and diamond holder | 5 Diamond bracket stud |
| 2 Chuck end grinding wheel | 6 Clamp nut |
| 3 Feed screw handle | 7 Valve head guide edge |
| 4 Shifter lever | 8 Grinding angle indicator plate |

Figure 9. Dressing chuck end grinding wheel.

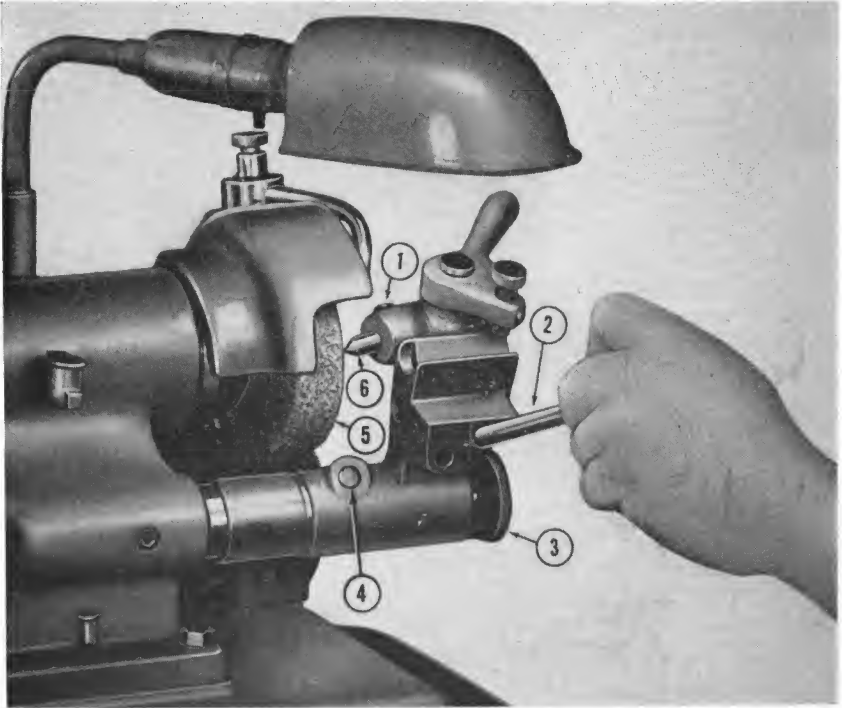
c. Removing or Changing the Chuck End Grinding Wheel.

- (1) Remove grinding wheel nut (left hand), the grinding wheel washer, and the offset grinding wheel from the spindle.

- (2) Reverse the procedure after a wheel has been replaced to secure a new wheel on the spindle.

d. Dressing Butt End Grinding Wheel (fig. 10).

- (1) The diamond (6) is removed from the bracket and diamond holder and clamped in place on the butt grinding attachment by an Allen head screw (1).
- (2) With the coolant flowing, the diamond is brought to the side of the butt end grinding wheel (5) by turning the micrometer feed nut (3).



- | | |
|------------------------|---------------------------|
| 1 Allen head set screw | 4 Clamp nut |
| 2 V-block arm handle | 5 Butt end grinding wheel |
| 3 Micrometer feed nut | 6 Diamond (in plug) |

Figure 10. Dressing butt end grinding wheel.

- (3) The diamond is passed across the side of the wheel by moving the V-block arm handle (2) alternately back and forth toward the rear and front of the machine. The diamond should be swung rapidly to produce a fast cutting surface as a slow swing glazes the wheel.

Note. If the butt grinding attachment is not moved easily back and forth across the wheel by the V-block arm handle, loosen clamp nut (4).

- (4) Repeat, taking light cuts, until the side of the wheel is dressed true and clean. Shut off the grinder.

- (5) Loosen set screw (1) and remove the diamond from the butt grinding attachment.

e. Attaching Butt Grinding Attachment (fig. 5).

- (1) Insert butt end grinding attachment (3) into drilled hole on the side of the V-block and lock in place with Allen head set screws on the V-block.
- (2) Adjust butt end grinding attachment as required with thumb screw at the bottom of the attachment.

13. Specific Operation

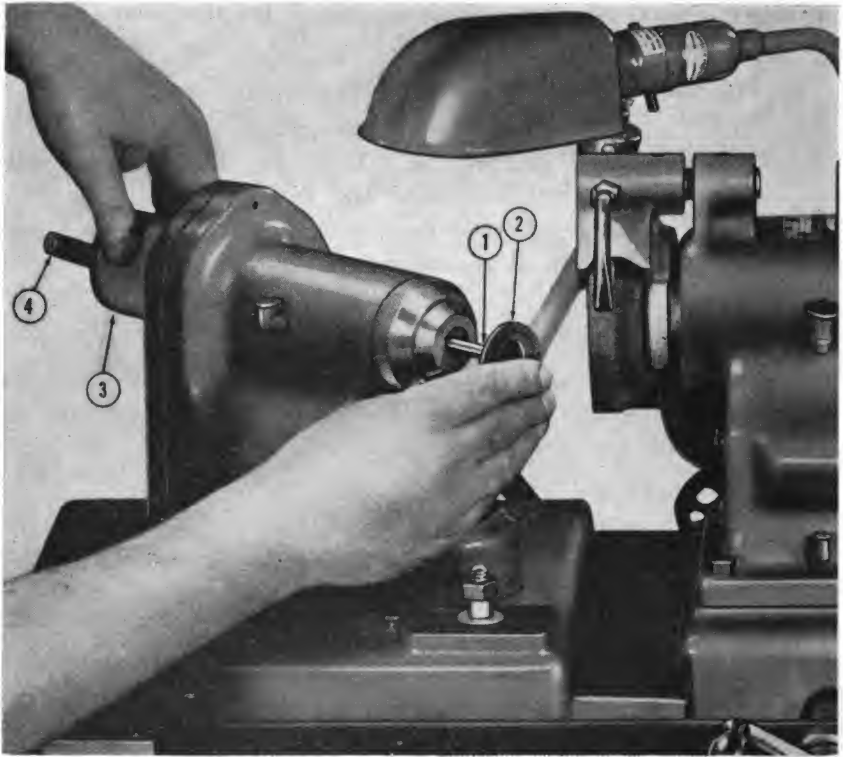
a. Grinding Rate and Depth. There must be a flow of coolant during all grinding operations. Grind with a steady motion and always take light cuts.

b. Valve Face Grinding.

- (1) *Adjusting valve head angle* (fig. 9). Loosen the clamp nut (6) with a 1/4-inch pin wrench and rotate the chuck and valve head assembly to the desired angle. Move the valve head until the guide edge (7) is in place at the desired angle on the angle indicator plate (8).
- (2) *Chucking the valve* (fig. 11). Open the chuck in the chuck and head assembly by turning the knurled hand wheel (3) counterclockwise. Insert the valve stem (1) in the chuck, allowing the valve face (2) to protrude about two inches. The valve should be positioned so that it is gripped on the worn portion of the stem which travels in the valve guide. In this way, the reground valve face will be concentric with the valve guide. After the first valve in a set is ground and before it is removed from the chuck, move the stop rod (4) in until it just touches the end of the valve stem. This will chuck all the valves in the set in the same position.
- (3) *Grinding valve face.*

Caution: Before doing any grinding, the operator must wear safety glasses.

- (a) Make sure the valve head is set for the proper angle and the valve is securely chucked, then start the grinder by pressing the start button on the start-stop switch.
- (b) Make sure there is a flow of coolant. If there is not, prime the pump (par. 12a) before proceeding.
- (c) Place the splash guard (5, fig. 12), in place, then move the shifter lever (4) slowly to the right until the valve face (1) is in front of the grinding wheel face (2).



1 Valve stem

2 Valve face

3 Hand wheel

4 Stop rod

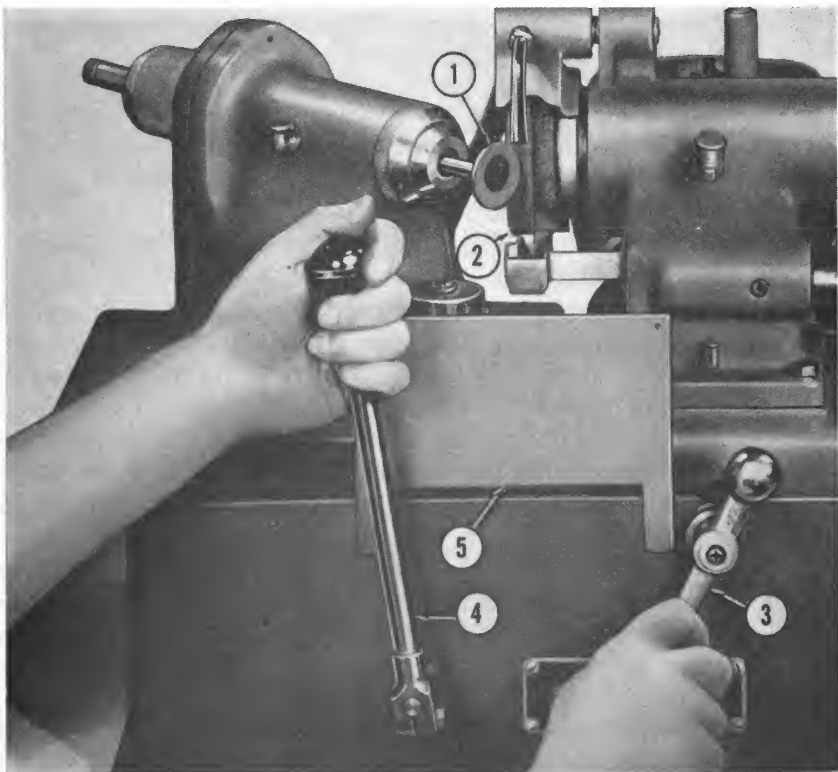
Figure 11. Chucking the valve.

This movement of the shifter lever automatically starts the chuck head motor and rotates the valve.

- (d) Slowly move the feed screw handle (3) counterclockwise. This moves the grinding head forward. Continue turning the feed screw handle counterclockwise until the grinding wheel face almost touches the valve face.
- (e) Move the shifter lever to the right until the valve face is almost at the right edge of the grinding wheel face.
- (f) Turn the valve head table stop nut (14, fig. 2) to the right until it contacts the valve head slide table (15). With the stop nut in this direction, the amount of travel of the valve across the grinding wheel face in the right hand direction is limited. Now, only the amount of left hand travel need be watched while the valve is being ground.

Note. While the valve is being ground, it should always be kept in contact with the grinding wheel to prevent the tension from varying.

- (g) Feed the grinding wheel face forward with the feed screw handle until it just touches the valve face. Then pass the valve face across the grinding wheel by moving the shifter lever to the left. After each complete pass of the valve, (across the wheel and back to the starting position) move the grinding wheel forward slightly so a light cut will be taken on the next pass of the valve.
- (h) When the grinding operation is finished, slowly back the grinding wheel away from the valve. This will insure a mirror-finish on the valve face. Do not finish grinding by moving the valve away from the grinder, as this will leave a rough surface on the valve face.
- (i) After the grinding wheel has been backed away from the valve, move the shifter lever to the extreme left. This automatically stops the chuck head motor and rotation of the valve stops. Shut off the grinder and remove the valve from the chuck.



1 Valve face
2 Chuck end grinding wheel
3 Feed screw handle
4 Shifter lever
5 Splash guard

Figure 12. Valve face grinding.

c. *Special Grinding Wheels.* The grinding wheels which come installed on the grinder are to be used for all valves of standard composition. However, when the manufacturer indicates that valves are made of stellite, a special wheel for grinding stellite (Thor 73535) must be used.

14. Butt Grinding

All butt grinding is done on the butt-grinding attachment (3, fig. 5) using the side of the butt grinding wheel (2).

a. *Ford Valve Stems.* The depth gage (fig. 6) is used to determine the proper setting of the butt grinding attachment when grinding a Ford valve. The seats in the engine block must be finished or ground before the depth gage is used.

- (1) Remove the valve and valve guide bushing from the engine block.
- (2) Loosen the set screw on the depth gage pilot which fits the valve to be ground. Make sure the edge of the locating body being used is the correct size for the valve. Loosen the clamping nut and insert the pilot and rod of the depth gage in the engine block.

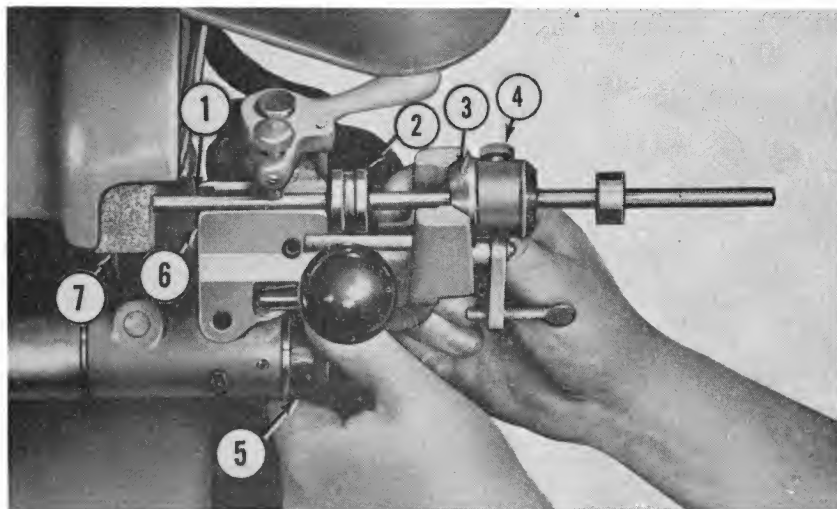
Note. The tappet must be down in a maximum closed position before the gage is used.

- (3) Slide the rod of the depth gage down until it touches the tappet. Tighten the clamping nut and remove the depth gage from the engine block. Tighten the pilot set screw.
- (4) Place the depth gage in the V-block with the locating body (3, fig. 13) flush with the V-block stop (2, fig. 14). Clamp depth gage rod (1, fig. 13) with swivel clamp (1, fig. 14). The proper setting of the micrometer feed nut (5, fig. 13) is obtained by noting the micrometer reading at which the rod touches the grinding wheel, and adding to it the tappet clearance in thousandths of an inch, as required by the valve manufacturer. Back the micrometer feed away and remove the depth gage from the V-block.
- (5) Place the valve in the V-block (fig. 14), with the valve face held tightened against the V-block stop (2) by the thumb screw (3), and the valve stem (6) clamped in place by the swivel clamp (1). Start the grinder and make sure there is a flow of coolant.
- (6) Move the valve stem in with the micrometer feed until it just touches the grinding wheel. Swing the valve stem across the grinding wheel by moving the V-block arm handle (4) first toward the rear, then toward the front of the machine. If the attachment does not swing

easily, loosen the clamp nut (5). Take light cuts of not more than 0.004 of an inch. Grind the valve stem until the micrometer feed nut shows that the stem is the correct length; see (4) above.

- (7) Move the valve stem away from the wheel and shut off the grinder.

Note. Valve stems which are used with adjustable tappets can be squared by placing them in the V-blocks and spinning the stems lightly against the wheel.



- | | | |
|------------------|-----------------------|-----------------------|
| 1 Depth gage rod | 3 Locating body | 6 V-block |
| 2 Pilot | 4 Clamping nut | 7 Butt grinding wheel |
| | 5 Micrometer feed nut | |

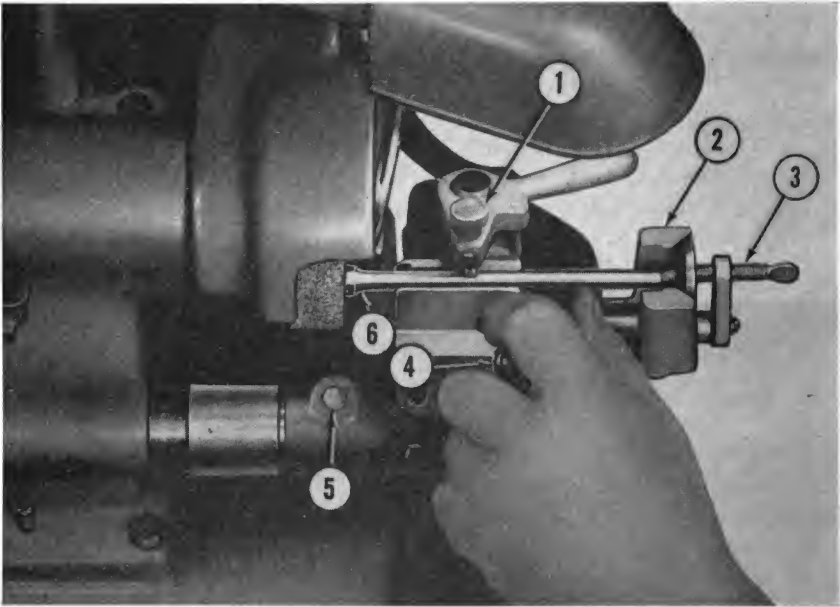
Figure 13. Adjusting butt grinding attachment to gage length.

b. Tappets.

- (1) Place the tappet (5, fig. 15) in the V-block (2) and secure it in place with the tappet clamp (1).
- (2) Start the grinder and make sure there is a flow of coolant.
- (3) Move the tappet toward the grinding wheel with the micrometer feed nut until it just touches. Taking light cuts, swing the tappet back and forth across the side of the wheel with the V-block arm handle. If the butt grinding attachment does not swing easily, loosen clamp nut (6).
- (4) When the tappet is true, move it away from the wheel and shut off the grinder.

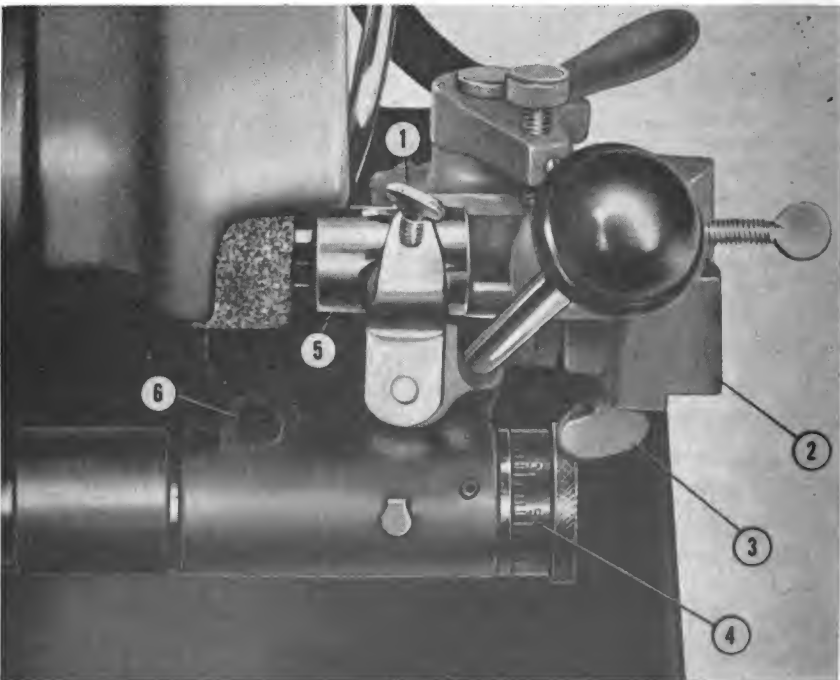
c. Rocker Arms.

- (1) Place the attachment pin (3, fig. 7) of the rocker arm grinding attachment in the drilled hole (5, fig. 5) in the butt grinding attachment. Place the rod of the rocker



- | | | |
|----------------|----------------------|--------------|
| 1 Swivel clamp | 3 Thumb screw | 5 Clamp nut |
| 2 V-block stop | 4 V-block arm handle | 6 Valve stem |

Figure 14. Grinding Ford valve stem.

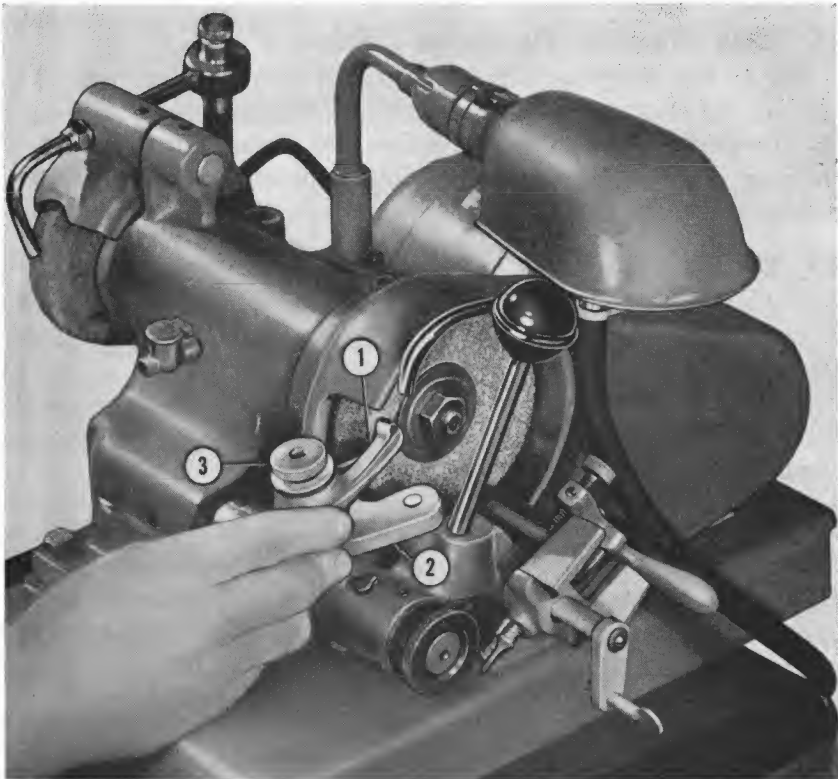


- | | | |
|----------------|-----------------------|-------------|
| 1 Tappet clamp | 3 V-stop thumb screw | 5 Tappet |
| 2 V-block | 4 Micrometer feed nut | 6 Clamp nut |

Figure 15. Grinding tappet.

arm grinding attachment through the center of the hole of the rocker arm, and clamp the rocker arm between the cone shaped washer (5, fig. 7) and the stud (6). Tighten the knurled nut (4) of the rocker arm grinding attachment.

- (2) Slide the rocker arm along the slot of rocker arm grinding attachment, and rotate the butt grinding attachment until the complete face of the rocker arm is in contact with the side of the grinding wheel (fig. 16). Tighten the clamp nut (2, fig. 7) on the rocker arm grinding attachment and the clamp nut (6, fig. 15) on the butt grinding attachment. This insures that the fixture will not swivel and that a single radius will be ground on the rocker arm face.
- (3) Start the grinder, and make sure coolant flows.
- (4) Using finger pressure, gently rock the rocker arm face against the grinding wheel. Grind lightly, removing only enough material to restore a new face.



1 Rocker arm 2 Rocker arm grinding attachment
3 Rocker arm grinding attachment nut

Figure 16. Grinding rocker arm.

15. Movement to a New Location

- a. Prior to moving the grinder to a new work site, remove all accessories such as the butt end grinding attachment, the lamp, lamp shade, and bulb.
- b. Remove grinder from present work site. Reverse procedure given in paragraph 6f.
- c. Cover the grinder and attachments with protective material and wrap in heavy paper.
- d. Secure the grinder to the bottom of the crate with bolts to prevent movement and add any wooden supports which may be necessary. Pack accessories around the grinder so they will not move.
- e. Nail crate shut and wrap it with steel straps. Transport to new work site.
- f. Unpack according to procedures outlined in paragraph 6.

Section IV. OPERATION UNDER UNUSUAL CONDITIONS

16. Cold Weather Operation (Below 0° F.)

Due to the nature of this equipment it would be impractical to operate it below freezing temperatures. The grinder will usually be operated in an inclosure where the temperature is above freezing. Perform the normal maintenance services. As an added precaution drain the coolant tank and lines to prevent freezing.

17. Operation in Extreme Heat

- a. *Lubrication.* Lubrication instructions are given in LO 5-4193. In extreme heat lubricate more frequently as directed for abnormal conditions or activities.
- b. *Coolant Tank and Lines.* Check coolant level more frequently than under normal conditions. Make sure the tank and lines are clean and free of grit and sludge.

18. Operation Under Sand or Dust Conditions

- a. *Lubrication.* Lubrication instructions are given in LO 5-4193. The grinder should be lubricated more frequently depending upon the amount of sand or dust in the air. Keep covers on all lubricating points tightly closed and check frequently to make sure no dirt or sand has entered.
- b. *Cleaning Interval.* The grinder should be thoroughly cleaned and lubricated as soon as possible after exposure. Drain the coolant and strain out any dirt or sand in it before re-using.
- c. *Protection.* Make sure the paint is in good condition. When not in use, keep the grinder covered.

CHAPTER 3

MAINTENANCE INSTRUCTIONS

Section I. SPECIAL ORGANIZATIONAL TOOLS AND EQUIPMENT

19. Special Service Tools

No special service tools are issued to organizational mechanics.

20. Tools Accompanying Grinder

For a list of tools accompanying the grinder, see the Department of the Army supply manual.

Section II. LUBRICATION

21. General Lubrication Information

a. Lubrication Order 5-4193 prescribes first and second echelon lubrication maintenance for the Independent Pneumatic Tool Company (Thor) Model 100 Valve Refacer.

b. A lubrication order is published for each item of equipment. The lubrication order shown in figure 17 is a reproduction of an approved lubrication order for this grinder. For the current LO 5-4193, refer to SR 310-20-4.

c. Lubrication orders prescribe approved first and second echelon lubrication procedures. The instructions contained therein are mandatory.

22. Detailed Lubrication Information

Prevent mud, dust, or coolant from entering the lubricant compartments by keeping the covers closed and in good condition. Use a clean dry cloth to keep the grinder free of dirt and grit. If dirt or grit is detected in a lubricant compartment, the oil should be changed immediately, and the mechanism disassembled and cleaned as soon as possible.

LUBRICATION ORDER

LO 5-4193

30 May 1952

GRINDER, ELECTRIC, VALVE REFACER, WET-TYPE, INDEPENDENT PNEUMATIC TOOL CO. (THOR), MODEL 100

Reference: TM 5-4193 TB 5-4193-1

Intervals given are maximums for normal 8-hour day operation. For abnormal conditions or activities, intervals should be shortened to compensate.

Clean fittings before lubricating.

Relubricate after washing or fording.

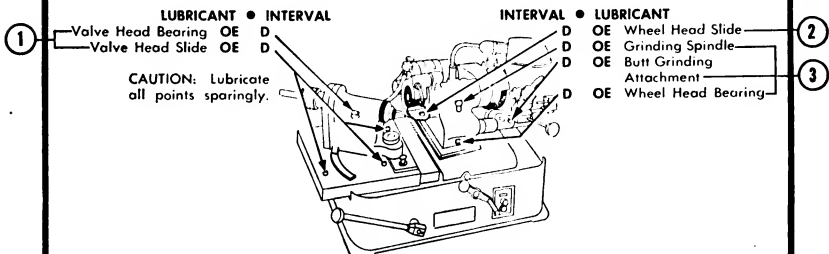
Clean parts with SOLVENT, dry-cleaning, or with OIL, fuel, diesel. Dry before lubricating.

Drain crank and gear cases only when hot after operation; check level and replenish when cool.

— KEY —

LUBRICANT	EXPECTED TEMPERATURES	INTERVAL
OE—Oil, engine	OE 10 or NS 9110 all temperatures	D—Daily

Ref.



NOTE:

Copy of this lubrication order will remain with the equipment at all times; instructions contained herein are mandatory and supersede all conflicting instructions dated prior to the date of this lubrication order.

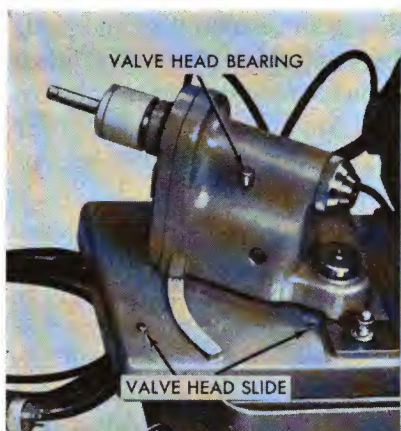
BY ORDER OF THE SECRETARY OF THE ARMY:

OFFICIAL:

WM. E. BERGIN
Major General, USA
The Adjutant General

J. LAWTON COLLINS
Chief of Staff
United States Army

Figure 17. Lubrication Order 5-4193.



Ref. 1. VALVE HEAD BEARING AND VALVE HEAD SLIDE: Clean fittings and apply lubricant. Only two of three valve head slide fittings are shown on the illustration; a third is under the chuck and head assembly.



Ref. 2. WHEEL HEAD SLIDE: Clean fittings and apply lubricant.



Ref. 3. GRINDING SPINDLE, WHEEL HEAD BEARING AND BUTT GRINDING ATTACHMENT: Clean fittings and apply lubricant.

Figure 17—Continued (LO references).

Section III. PREVENTIVE MAINTENANCE SERVICES

23. General

The operator of the grinder and organizational maintenance personnel must perform their preventive maintenance services regularly to make sure the grinder operates well and to reduce the chances of mechanical failure.

24. Operator Maintenance

a. Inspections. Inspections must be made before operation, during operation, at halt, and after operation as described in this

section. All inspections of assemblies, subassemblies, or parts must include any supporting members of connections and must determine whether the unit is in good condition, correctly assembled, secure, or excessively worn. Any mechanical condition which might result in further damage to the unit must be corrected before the equipment is operated.

- (1) The inspection for "good condition" is usually an external visual inspection to determine whether the unit is damaged beyond safe or serviceable limits, or to determine if it is in such a condition that damage will result from operation. The term "good condition" is further defined as, not bent or twisted, not chafed or burned, not broken or cracked, not bare or frayed, not dented or collapsed, not torn or cut, and adequately lubricated.
- (2) Inspection of a unit to see that it is "correctly assembled" is usually an external visual inspection to determine whether it is in normal assembled position on the equipment.
- (3) Check of a unit to determine if it is "secure" is usually an external inspection, a hand-feel, or a pry-bar or wrench check for looseness in the unit. Such an inspection should include brackets, lock washers, lock nuts, locking wires, and cotter pins used in the assembly.
- (4) "Excessively worn" means worn close to or beyond serviceable limits, a condition likely to result in a failure if replacement of the affected parts is not made before the next scheduled inspection.

b. Reporting Deficiencies. The operator will report all deficiencies on DD Form 110, Vehicle and Equipment Operational Record.

c. Before-Operation Services. The following services will be performed to determine if the condition of the equipment has changed since it was last operated and to make sure it is ready for operation. Any deficiencies must be corrected or reported to the proper authority before the unit is put into operation.

- (1) *Leaks, general.* Check the entire unit for leaks, paying particular attention to lines and connections. Look under the grinder for signs of leaks, paying particular attention to coolant lines and connections. Correct or report any leaks noted.
- (2) *Visual inspections.* Check for any tampering or damage which may have occurred since the unit was last operated.

Make sure the electrical plug is properly connected. See that all attachments in use are correctly assembled, securely mounted, and in good operating condition.

d. During-Operation Services. The operator is responsible for correcting or reporting unusual sounds and odor, deficiencies in performance, or other signs of abnormal operation. He will perform the following specific services:

- (1) *Abnormal operation.* Check for any unusual operation such as coolant not being pumped, vibration in the motors or grinding wheels, and failure to respond to the controls. If coolant is not being pumped, do not grind until pump is primed (par. 12a).
- (2) *Unusual noises.* If any unusual noise is noted stop operation and report condition to the proper authority.

e. At-Halt Services. During halts, even if only for short periods, the operator should make a general check of the equipment and correct or report any deficiencies noted, in addition to performing the following specific duties:

- (1) *Leaks, general.* Check the entire unit for leaks, paying particular attention to coolant lines and connections. Look for signs of leaks under the machine. Correct or report any leaks noted.
- (2) *Visual inspection.* Check the entire grinder for loose or missing bolts and nuts, and for bent, cracked, and missing parts. Check motors and bearings for signs of overheating. Check condition of electrical and flexible cable. See that all attachments are securely mounted.

f. After-Operation Services. To make sure that the equipment is ready to operate at any time, the following services must be performed by the operator immediately after any operating period of 8 hours or less. All deficiencies must be corrected or reported to the proper authority.

- (1) *Clean equipment.* Remove all dirt and excess grease from entire grinder unit. See that the coolant tank is free of grit and sludge.
- (2) *Tools and equipment.* See that all tools and equipment assigned to the grinder are serviceable, clean, and properly stowed or mounted.
- (3) *Lights.* See that light is clean, securely mounted, and in good condition.
- (4) *Lubrication.* Lubricate as specified in lubrication order LO 5-4193.

- (5) *Motor operation.* Correct or report unusual noises or performance irregularities noted during operation.
- (6) *Visual inspection.* Check the entire unit for leaks, bent or broken parts, and loose or missing bolts and nuts.

25. Maintenance and Safety Precautions

- a. Always correct or report any mechanical deficiencies that may result in further damage to the unit if operation is continued.
- b. Before starting the grinder, make sure the current source to which it is connected is 110 volts.
- c. Never force a grinding wheel or a spindle.
- d. Do not use the grinder unless there is a flow of coolant.
- e. Always take light cuts.
- f. Keep V-belts and electric cords from contact with coolant or oil because they will deteriorate.
- g. Do not operate grinder without using safety glasses.
- h. Make sure piece is securely held before attempting to grind.
- i. Dress wheel before starting to grind.

26. Organizational Maintenance

a. Organizational preventive maintenance is performed by organizational maintenance personnel, with the aid of the operator, at weekly and monthly intervals. The weekly interval will cover about 60 hours of use and the monthly interval will be equivalent to 4 weeks of use.

b. The preventive maintenance services to be performed at the regular intervals are listed and described below. The numbers appearing in the columns opposite each service refer to a corresponding number appearing on DA Form 464 and indicate that a report of the service should be made at that particular number on the form. These numbers appear in the second, and third, or in both columns as an indication of the interval at which the service is to be performed. The column headed Technical Inspection is provided for the information and guidance of personnel performing technical inspections and constitutes the minimum inspection requirements for the equipment.

Technical inspection	Services		
	Monthly	Weekly	
1	1	1	<i>Before-operation services.</i> Check and perform services listed in paragraph 24c above.
2	2	2	<i>Lubrication.</i> Inspect the grinder for missing or damaged lubrication fittings and for indication of insufficient lubrication, see LO 5-4193.
	2	2	Replace missing or damaged fittings. Lubricate as specified in lubrication order.
3	3	3	<i>Tools and equipment.</i> Inspect condition of all tools and equipment assigned to the grinder. See that all tools and equipment are clean, serviceable, and properly stowed or mounted.
5	5	5	<i>Publications.</i> See that a copy of this manual, LO 5-4193 and TB 5-4193-1 are with the equipment and in serviceable condition.
6	6	6	<i>Appearance.</i> Inspect the general appearance of the machine, paying special attention to the cleanness, legibility of identification markings and condition of paint.
	6	6	Correct or report any deficiencies noted.
7	7	7	<i>Modification.</i> See if all available modification work orders applying to this grinder have been completed and are recorded on DA Form 478.
ELECTRIC SYSTEM			
50	50	50	<i>Wiring and switches.</i> Inspect wiring for oil-soaked, cracked, or frayed insulation. Check condition, and mounting of switches.
	50	50	Replace defective wires and switches. See that wiring is in good condition and that connections are clean and tight.
52	52	52	<i>Light.</i> Check the operation of the light, and inspect it for loose mounting nuts or bolts or a defective bulb.
	52	52	See that the light is securely mounted and in good operating condition.
CONTROL SYSTEM			
62	62	62	<i>Levers and cables.</i> Check the operation of the shift lever and feed screw handle. Inspect the cable for excessive wear or damage.
	62	62	Renew, repair or adjust defective levers or cables (par. 56).
FRAME			
80	80	80	<i>Frame.</i> Check frame for bent members, breaks or cracks, and for loose or missing mounting and assembly belts and nuts.
	80	80	Tighten or replace loose or missing bolts and nuts. See that any damaged parts are repaired or replaced.

Technical inspection	Services	
	Monthly	Weekly
129	129	129
	129	129
183	183	183
	183	183
185	185	185
186	186	186
	186	186

MISCELLANEOUS ITEMS

Belts. Inspect all belts for excessive wear or damage. Check for proper operation and adjustment. Belts are properly adjusted when they can be deflected one-fourth inch at a point midway between the pulleys without undue pressure.

Adjust belts if necessary (par. 66a). Replace belts if frayed or badly worn.

Grinding wheels. Inspect the chuck-end and butt-end grinding wheels to make sure they are clean and true, and not cracked, chipped or pitted.

Dress wheels which are not true (par. 12b and c). Replace defective wheels.

PUMPS

Coolant pump. Inspect pump for cracks and damage. Check for leaks and loose or missing bolts and nuts. Make sure pump primes. Tighten or replace any loose, missing, or broken bolts and nuts. Correct or report any leaks. If pump does not prime, prime it (par. 12a).

Hose and tank. Inspect hoses and connections for leaks, damage, and excessive deterioration. See that pump coolant tank is free of grit and sludge and properly mounted.

Renew worn or damaged hoses and connections and correct any leaks. Clean coolant tank if necessary.

Section IV. TROUBLE SHOOTING

27. General

This section provides information useful in diagnosing and correcting unsatisfactory operation or failure of the grinder. Each trouble symptom stated is followed by a list of probable causes of the trouble. The remedy recommended is described opposite the probable cause.

28. Motor Will Not Start

Probable cause

Power source failure.

Possible remedy

Check source of power supply.
Make certain source is 110-volts ac or dc.

Line trouble.

Check for loose connections,
worn or frayed wires.

Start-stop switch out of order.

Check the switch for loose connections or defective parts.

29. Intermittent Sparking at Brushes

Probable cause

Open armature winding.

Broken or sluggish acting
brush holder spring.

Possible remedy

Locate and repair or replace
bad coil.

Replace (pars. 64d and 68e).

30. Excessive Sparking or Flashing at Brushes

Probable cause

Rough commutator.

Low bar on commutator.

Brushes too short.

Weak brush spring.

Brushes sticking in holders.

Dirt or oil on commutator.

Possible remedy

Sand or turn down, depending
on depth of surface roughness.

Grind or turn down balance of
commutator.

Replace.

Replace.

Free them. Clean brushes and
holders.

Wipe off. Clean brushes if
glazed.

31. Regular Clicking

Probable cause

Foreign matter in air gap.

Possible remedy

Take out armature; remove
matter.

32. Rapid Knocking

Probable cause

Misalignment (possibly causing
shoulder of shaft to pound
periodically against bearing
end).

Possible remedy

Realign shaft.

33. Vibration

Probable cause

Motor, V-belt, or grinder part
not securely fastened.

Possible remedy

Run motor disconnected from
machine for check. Securely
fasten all grinder parts.

34. Motor Overheating

Probable cause

Incorrect power source.
Dirt in motor.

Improper ventilation

Possible remedy

Check power source.
Blow out motor. Use solvent on wound section if necessary.
Check motor ventilation fan.

35. Bearing Overheating

Probable cause

Misalignment.
Too much tension in belt drive.

Possible remedy

Realine.
Reduce tension to point of adequacy.

36. Poor Coolant Flow

Probable cause

Pump not primed.
Lines clogged.

Possible remedy

Prime pump (par. 12a).
Clean coolant tank strainer. Remove and clean coolant lines.

37. Breakage of Shifter Cable

Probable cause

Sharp surface on underside of slide.

Possible remedy

Smooth with file.

38. Chatter Marks on Work Surface

Probable cause

Poorly dressed wheel.
Defective grinding wheel.

Possible remedy

Redress wheel (par. 12b and d).
Replace.

39. Scratches on Work Surface

Probable cause

Defective grinding wheel.
Loose abrasive particles between wheel and work.

Possible remedy

Replace.
Remove any dirt or grit around wheel and work.

40. Feed or Spindle Lines on Work Surface

Probable cause

Faulty truing.
Soft or cracked diamond.

Possible remedy

Make certain diamond is set on just below the horizontal center line of the wheel.
Replace.

41. Cracks or Check Marks on Work

Probable cause

Improperly dressed wheel.

Defective grinding wheel.

Possible remedy

Redress wheel (par. 12b and d).

Replace.

42. Work Out of Round

Probable cause

Worn bearings or loose grinding wheel shaft.

Possible remedy

Clean and inspect grinding head bearings. Inspect shaft for defects or wear. Replace shaft or bearings if excessively worn or defective.

43. Work Is Discolored or Burned

Probable cause

Depth of grind excessive.

Improperly dressed wheel.

Possible remedy

Take a lighter cut.

Redress wheel (par. 12b and d).

CHAPTER 4

FIELD AND DEPOT MAINTENANCE

Section I. INTRODUCTION

44. General

Instructions in this section and in succeeding sections of this chapter are published for the information and guidance of maintenance personnel responsible for third and higher echelons of maintenance of this grinder. They contain information on maintenance of the grinder which is beyond the scope of the tools, equipment, or supplies normally available to using organizations.

45. Procedure

The following sections describe the complete disassembly, repair, and reassembly of each major unit or system comprising the grinder. Before proceeding with overhaul, check to see that replacement parts are available.

Section II. CHUCK AND HEAD ASSEMBLY

46. General

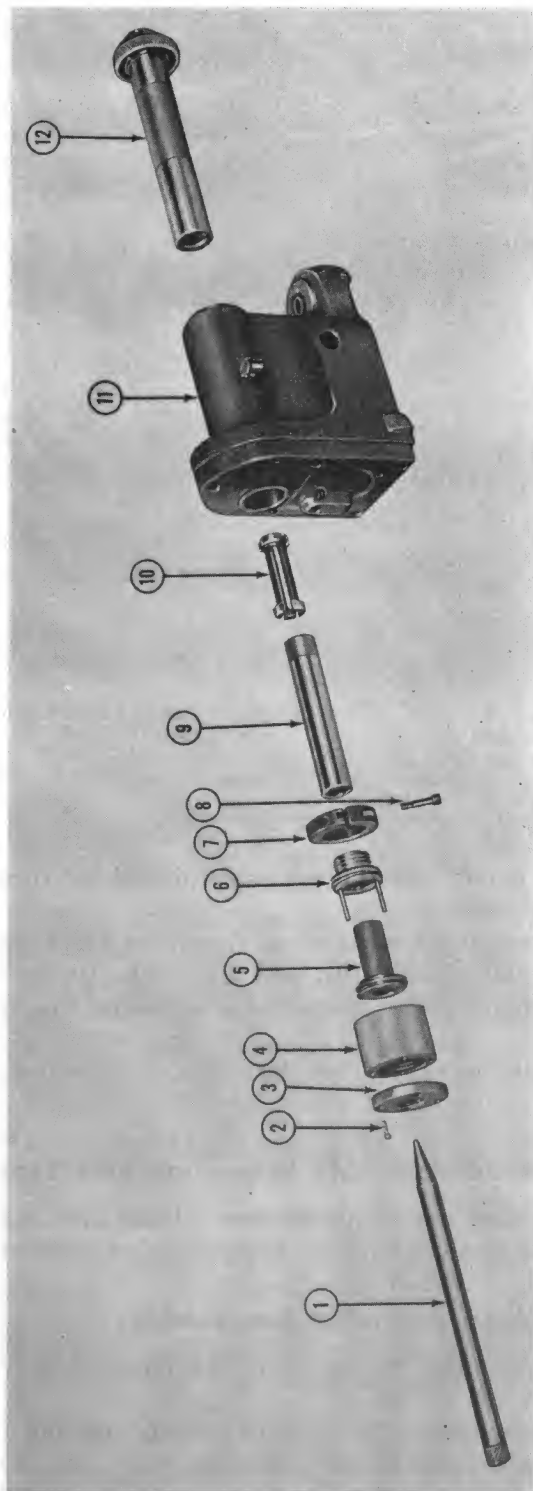
The chuck and head assembly is of heavy steel construction and is equipped with a quick-opening collet which permits easy insertion and removal of valves. The chuck is rotated by a motor located inside the head assembly. Disassembly of this motor is covered in paragraph 62.

47. Chuck and Head Assembly Removal and Disassembly

a. Remove the clamp nut (2, fig. 19) from the valve head slide (1). Lift the chuck and head assembly from the grinder and place it on a work bench.

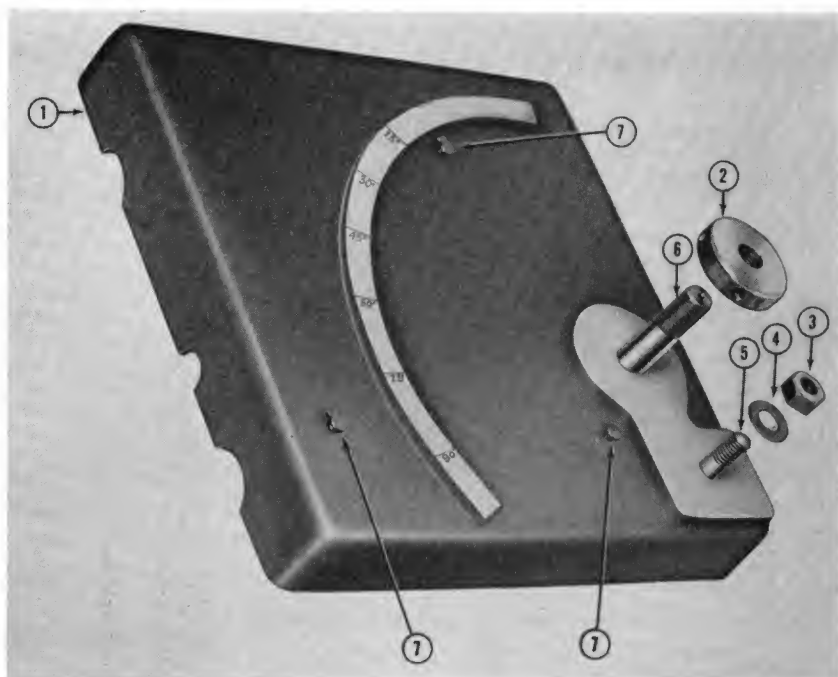
b. Remove the stop rod (1, fig. 18). Then remove the four cap screws (2) and the cover plate (3).

c. Rotate the outer sleeve (4) counterclockwise. This causes the inner sleeve (5) and the threaded bushing (6) to unscrew simultaneously from the outer sleeve. The threaded bushing will remain in the spindle.



- | | | | | | |
|---|-----------------------|---|---------------------------------|----|--------------------|
| 1 | Stop rod | 7 | Valve head spindle collar | 10 | Collet |
| 2 | Cover plate cap screw | 8 | Valve head spindle collar screw | 11 | Valve head housing |
| 3 | Cover plate | 9 | Collet sleeve | 12 | Spindle |

Figure 18. Chuck and head assembly.



- | | |
|-----------------------------|-------------------------------|
| 1 Valve head slide | 4 Diamond bracket stud washer |
| 2 Valve head clamp nut | 5 Diamond bracket stud |
| 3 Diamond bracket stud nut | 6 Valve head stud |
| 7 Valve head slide oil cups | |

Figure 19. Valve head slide assembly.

d. Insert a screw driver between the guide pins of the threaded bushing from the spindle.

e. Insert a rod into the front end of the valve head housing (11), and eject the collet sleeve (9), and the collet (10).

f. Unscrew the spindle collar screw (8) and remove the spindle collar (7).

g. Remove the spindle (12) from the front of the valve head housing.

48. Chuck and Head Assembly Inspection and Repair

Clean all metal parts with dry-cleaning solvent and examine them for damage or excessive wear. Replace defective parts.

49. Chuck and Head Assembly Reassembly

a. Insert the spindle (12, fig. 18) into the front of the valve head housing.

b. Place the spindle collar (7) over the spindle end and insert and tighten the spindle collar screw (8).

- c. Replace collet (10) and insert collet sleeve (9).
- d. Thread the threaded bushing (6) clockwise into the spindle. Insert a screw driver between the guide pins of the threaded bushing and draw it up tight.
- e. Thread the outer sleeve (4) clockwise on the threaded bushing for approximately three-quarters of a turn.
- f. Thread the inner sleeve (5) approximately three-quarters of a turn counterclockwise into the outer sleeve so that the two holes in the inner sleeve line up with the guide pins on the threaded bushing (6).
- g. Insert a finger into the inner sleeve (5) and hold it stationary while rotating the outer sleeve (4) clockwise. Rotate the outer sleeve until it is at least flush with the end of the inner sleeve.
- h. Place the cover plate (3) in position with the recessed side in and fasten with the four cap screws (2). Replace the stop rod (1).
- i. Place the chuck and head assembly in position on the grinder, and tighten the clamp nut (2, fig. 19) and stud (6) on the valve head slide (1).

Section III. GRINDING HEAD ASSEMBLY

50. General (fig. 20)

The grinding head assembly has a 4-inch offset grinding wheel (3) at the chuck end and a 4-inch cup wheel (26) at the butt end. The chuck end wheel is used for valve face grinding, and the butt end wheel for valve stem, tappet, and rocket arm grinding. The grinding head assembly has a V-belt connection (20) to the motor, located directly behind it, which rotates it.

51. Grinding Head Assembly Removal and Disassembly (fig. 20)

- a. Remove the four screws (28) and washers (29) and the two guard screws (24) and washers (23) which hold the grinding wheel assembly to the grinding wheel table. Remove the right hand wheel guard (22), coolant spout (25), and needle valve (8). Remove the V-belt (20) which connects the assembly to the motor from the motor pulley. Move the assembly to a work bench.
- b. Remove the left hand wheel nut (1) and washer (2), then remove the offset grinding wheel (3).

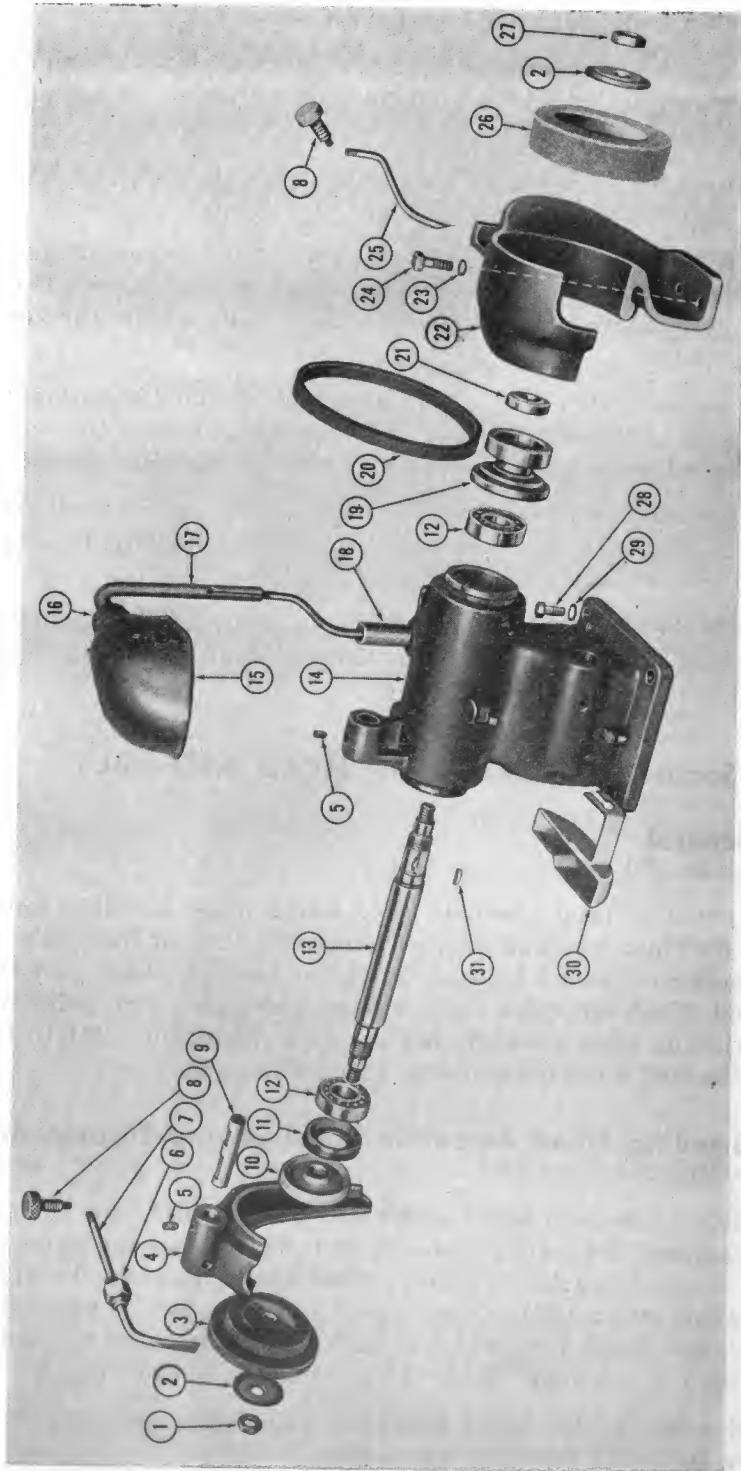


Figure 20. Grinding head assembly.

1 Grinding wheel nut (left hand)	18 Lamp swivel outer sleeve
2 Grinding wheel washer	19 Spindle pulley
3 Offset grinding wheel	20 Wheel head V-belt
4 Wheel guard (left hand)	21 Spindle pulley nut
5 Guard shaft screw	22 Wheel guard (right hand)
6 Coolant spout clamp nut	23 Guard washer (right hand)
7 Coolant spout (left hand)	24 Guard screw (right hand)
8 Needle valve	25 Coolant spout (right hand)
9 Wheel guard shaft (left hand)	26 Cup grinding wheel
10 Driving collar	27 Grinding wheel nut (right hand)
11 Ball bearing clamp nut	28 Grinding wheel head screw
12 Ball bearing	29 Grinding wheel head screw washer
13 Spindle	30 Drain pan
14 Wheel head housing assembly	31 Pulley key
15 Lamp reflector	
16 Lamp body	
17 Lamp swivel inner sleeve	

Figure 20—Continued.

c. Remove the coolant spout clamp nut (6) and needle (8). Remove the coolant spout (7).

d. Remove the two guard shaft screws (5) and remove the left hand wheel guard (4) and shaft (9).

e. Remove the driving collar (10) and the ball bearing clamp nut (11).

f. Using a soft face mallet, tap the spindle (13) and right hand wheel assembly from the wheel assembly (14).

g. Remove the right hand grinding wheel nut (27), washer (2), and grinding wheel (26).

h. Remove the spindle pulley nut (21). Remove the spindle pulley (19) and remove the pulley key (31) from the spindle (13).

i. Press the right hand bearing (12) from the spindle (13) with an arbor press, using a suitable drive collar.

j. Using a soft drift and mallet remove the left bearing (12) from the wheel head housing (14).

k. Remove the lamp reflector (15) and pull the lamp swivel inner sleeve (17) out of the outer (18). Remove the drain pan (30).

52. Grinding Head Assembly Inspection and Repair

a. Check the wheel housing and guard for cracks and damage.

b. Check the spindle for cracks, scratches, and alignment. Check the spindle key and keyway for cracks and chips. If defective, replace.

c. Check the grinding wheels for cracks or chips. If cracked or badly chipped, replace.

d. Inspect all threads on the spindle, and the coolant spouts, screws, and nuts. If worn or stripped, replace or rethread.

e. Check the V-belt and electrical wiring. If worn or frayed, replace.

f. Check ball bearings for chips, cracks, or misalignment. If defective, replace.

53. Grinding Head Assembly Reassembly

(fig. 20)

a. Place the lamp swivel inner sleeve (17) in the outer sleeve (18) and screw the lamp reflector (15) in place. Replace the drain pan (30).

b. Insert the spindle (13) in the wheel housing, with the key-way to the right. Insert the right hand ball bearing (12) in place.

c. Place the pulley key (31) in the keyway on the spindle, and slide the spindle pulley (19) on the spindle. Secure in place with the spindle pulley nut (21).

d. Replace the right-hand grinding wheel (26) and secure in place with the right-hand grinding wheel nut (27) and washer (2).

e. Replace the left hand ball bearing (12) and secure in place with ball bearing clamp nut (11).

f. Screw the driving collar (10) in place on the spindle. Replace the left-hand grinding wheel (3) on the spindle and secure with the left-hand grinding wheel nut (1) and washer (2).

g. Insert the wheel guard shaft (9) in the wheel head housing (14) and left-hand wheel guard (4). Secure the shaft in place with the two guard shaft screws (5).

h. Replace the grinding wheel assembly on the grinding wheel table and fasten in place with the four screws (28) and washers (29).

i. Replace the V-belt (20) connecting the grinding wheel assembly to the motor.

j. Replace the right-hand wheel guard (22) and fasten in place with the two guard screws (24) and washers (23).

k. Replace the left-hand coolant spout (7), right-hand coolant spout (25), and two needle valves (8), and connect them to the coolant pump.

Section IV. BASE ASSEMBLY

54. General

The base and controls assemblies include the base, feed screw, shifter lever, valve head table, wheel head cross slide, and coolant

pump. They support, control the movement, and provide coolant for the grinder. The base itself is of one-piece steel construction.

55. Feed Screw Assembly

(fig. 21)

a. General. The feed screw handle (15), which is located on the front of the machine on the operator's right, controls the movement of the cross slide toward and away from the operator.

b. Removal and Disassembly.

- (1) Remove feed screw handle screw (17) and washer (16).
- (2) Remove feed screw handle (15), spring washer (14), cup washer (13), two thrust washers (11), bearing (12), and sleeve (10).
- (3) Remove two feed screw lock nuts (4), two thrust washers (5), and bearing (6).
- (4) Unscrew feed screw (9).

c. Inspection and Repair.

- (1) Check threads on feed screw and nuts. If worn or stripped, rethread or replace.
- (2) Inspect feed screw and sleeve for cracks or misalignment. If damaged, replace.
- (3) Check both bearings for cracks, chips, or misalignment. If damaged or worn, replace.
- (4) Check washers for damage or breakage. If worn or damaged, replace.

d. Reassembly.

- (1) Screw feed screw (9) into place.
- (2) Slide sleeve (10) over end of feed screw.
- (3) Replace thrust washer (11), bearing (12), other thrust washer, cup washer (13), and spring washer (14).
- (4) Replace feed screw handle (15), washer (16), and screw (17), tighten.
- (5) Replace one thrust washer (5) on the other end of the feed screw. Replace bearing (6) and other thrust washer. Thread one lock nut (4) on the feed screw, and tighten until there is enough tension on spring washer (14) so that cup washer (13) cannot be turned by hand.
- (6) Lock in place with other lock nut (4).

56. Shifter Lever

a. General. The shifter lever, which is located at the front of the machine on the operator's left, controls the movement of the valve head table toward and away from the chuck end grinding wheel.

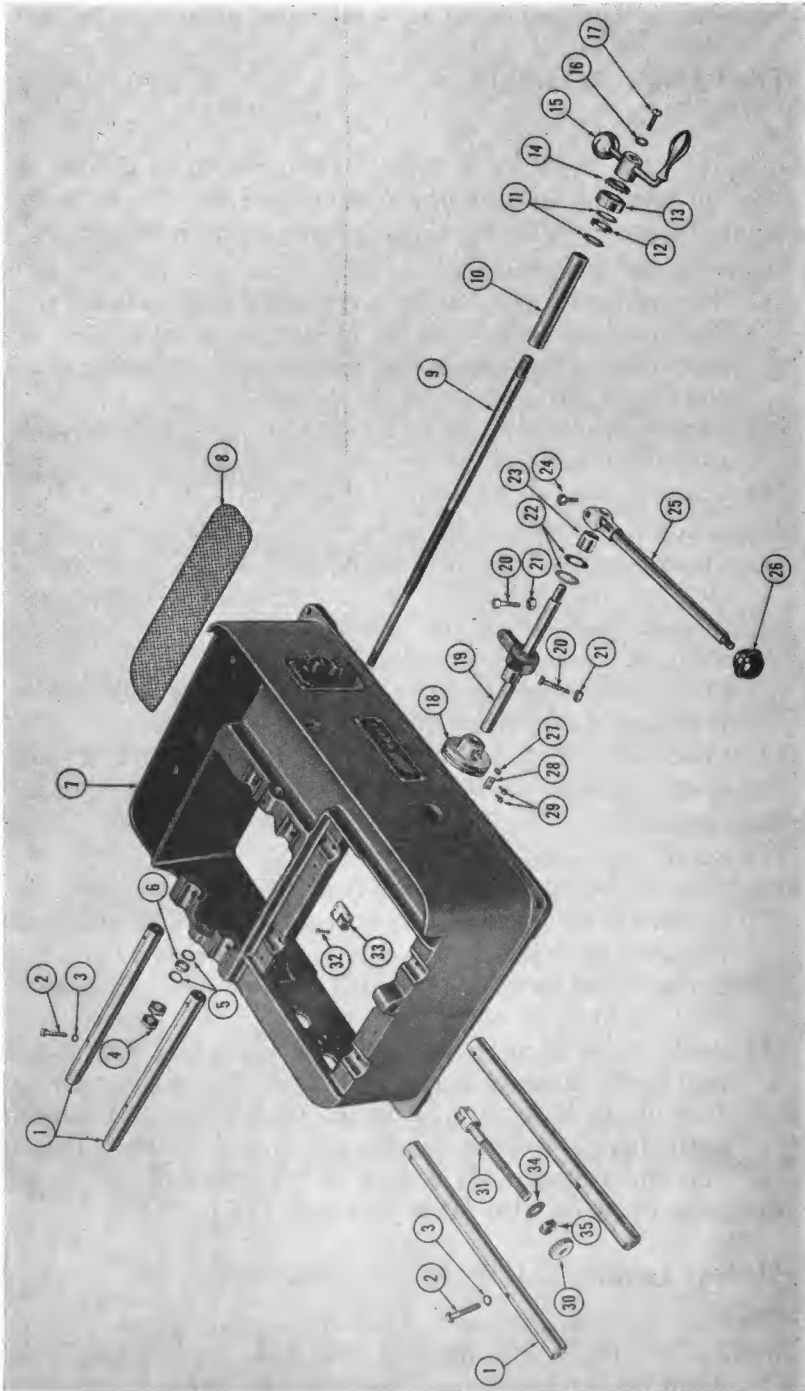


Figure 21. Base and controls.

- 1 Slide rod
- 2 Slide rod screw
- 3 Slide rod screw lock nut
- 4 Feed screw lock nut
- 5 Thrust washer
- 6 Thrust bearing
- 7 Base
- 8 Coolant tank screen
- 9 Feed screw
- 10 Feed screw sleeve
- 11 Thrust washer
- 12 Thrust bearing
- 13 Cup washer
- 14 Spring washer
- 15 Feed screw handle
- 16 Feed screw handle washer
- 17 Feed screw handle screw
- 18 Shifter pulley

- 19 Shifter shaft
- 20 Stop arm screw
- 21 Stop arm screw nut
- 22 Shifter lever washer
- 23 Shifter shaft collar
- 24 Shifter lever screw
- 25 Shifter lever
- 26 Shifter lever knob
- 27 Shifter pulley set screw
- 28 Shifter pulley clamping lug
- 29 Shifter pulley clamping lug screw
- 30 Stop stud nut
- 31 Stop stud assembly
- 32 Tight roller bracket screw
- 33 Tight roller bracket assembly
- 34 Top stud washer
- 35 Top stud lock nut

Figure 2 Contin

nbly

tilt,

rel

b. Removal and Disassembly.

- (1) Remove cable clamp (6), clamp screw (5), and clamp nut (7). Remove (4)
- (2) Remove right roller bracket screw (32, fig. 21) and right roller bracket assembly (33)
- (3) Remove shifter pulley set screw (clamping lug (28) and clamping lug screw (29). Remove shifter pulley (18).
- (4) Remove shifter lever screw (24), shifter lever (25), collar (23), and two washers (22). Remove two stop arm screws (20) and nuts (21). Unhook (26) from shifter lever (25). Remove shifter shaft (19) from inside of base.

c. Inspection and Repair.

- (1) Check all metal parts for cracks or wear.
- (2) Inspect threads on screws. If worn or stripped, replace.
- (3) Check cable. If worn or frayed, replace. Also check underside of valve head table for sharp edges. If there are sharp edges smooth with file before replacing cable.

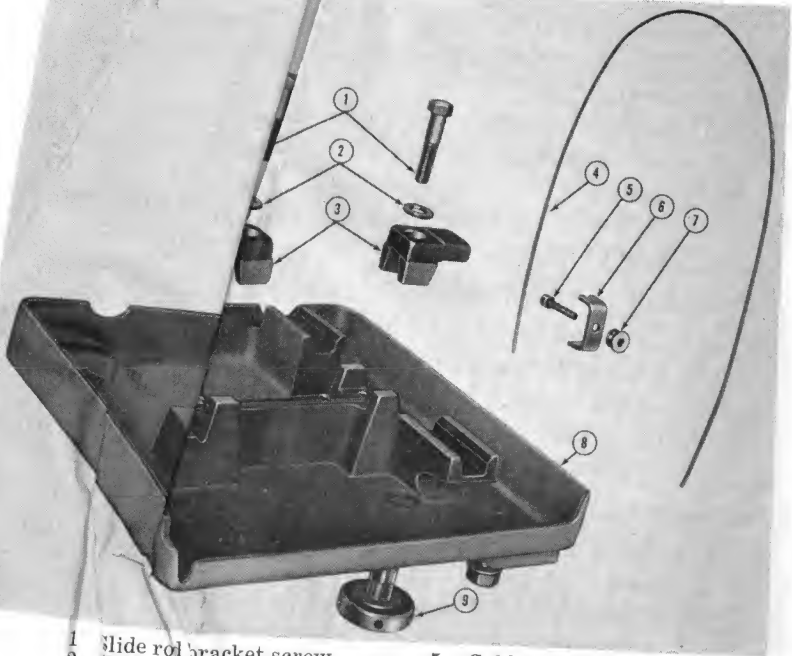
d. Reassembly.

- (1) Place shifter shaft (19) through hole from inside of base.
- (2) Place shifter pulley (18) on end of shifter shaft. Replace and tighten shifter pulley set screw (27).
- (3) Replace cable (4, fig. 22). Replace and tighten cable clamp (6) and clamp screw (5) and nut (7).
- (4) Replace shifter pulley clamping lug (28, fig. 21), insert two clamping lug screws (29), and tighten.

- (5) Replace right roller bracket screw (20) and nuts (21).
- (6) Replace and tighten left roller bracket screw (20) and nuts (21).
- (7) Place two shifter levers in place on end of shifter shaft (19). Tighten shifter lever screw onto lever (25). Insert shifter lever (25).
- (8) Screw shifter lever (26) onto shifter lever (25).

57. Coolant Pump (fig. 23)

a. General. The coolant pump (4) is the centrifugal type and is located under the right side of the base. It is connected to the grinding head motor V-belt drive (3). A 9-inch length of hose (2) connects the pump inlet (5). A screen on top of the pump tank keeps the coolant free of grit. A 15½-inch length of hose carries the coolant from the pump outlet (6) to the hose assembly. It then goes to the two coolant spouts (fig. 23).



- | | |
|----------------------------|---------------------|
| 1 Slide rod bracket screw | 5 Cable clamp screw |
| 2 Slide rod bracket washer | 6 Cable clamp |
| 3 Slide rod bracket | 7 Cable clamp nut |
| 4 Shifter cable | 8 Valve head slide |
| 9 Valve head clamp nut | |

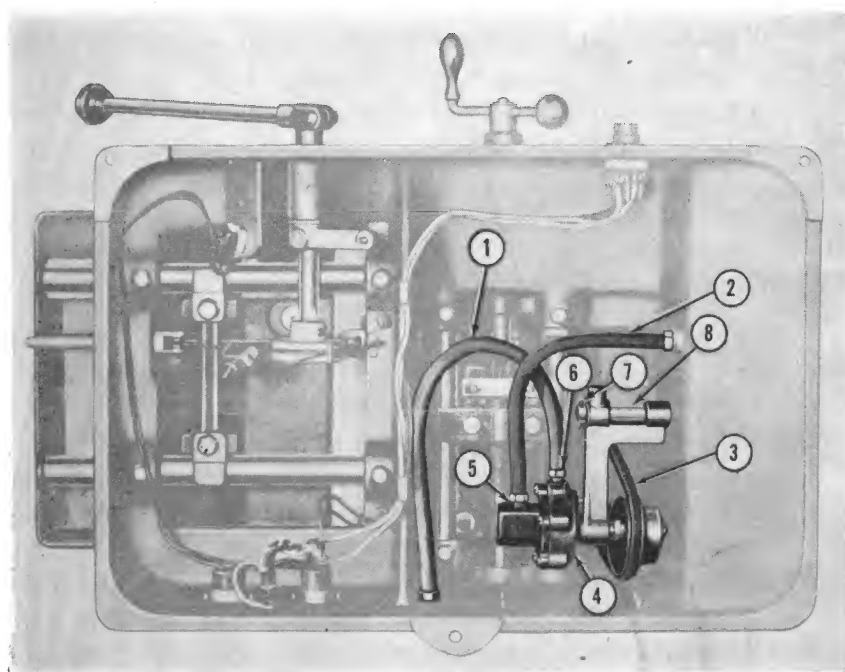
Figure 22. Valve head table.

b. Removal and Disassembly. If damaged, the pump assembly is usually replaced as a unit. To remove the pump as a unit—

- (1) Drain coolant tank. (Lift grinder base assembly, tilt, and drain the coolant from the tank.)
- (2) Unscrew both hoses (1) and (2) from the pump.
- (3) Slip V-belt (3) from pulley.
- (4) Remove cotter key (7) and washer from pump swivel stud (8) and remove pump assembly.

c. Replacement. To replace the pump as a unit—

- (1) Place the pump assembly on the pump swivel stud (8) and replace washers and cotter key (7).
- (2) Slip V-belt (3) on pulley.
- (3) Screw both hoses (1) and (2) on the pump.
- (4) Fill coolant tank.



- | | |
|-----------------|--------------------------|
| 1 Outlet hose | 5 Pump inlet housing |
| 2 Inlet hose | 6 Pump outlet housing |
| 3 V-belt | 7 Swivel stud cotter key |
| 4 Pump assembly | 8 Pump swivel stud |

Figure 23. Coolant pump.

58. Valve Head Table

a. General. The valve head table holds the chuck and head assembly and the diamond bracket holder. Inscribed on the top of the valve head table is the valve face grinding angle indicator.

b. Removal and Disassembly.

- (1) Remove two slide rod bracket screws (1, fig. 22), washers (2), and brackets (3).
- (2) Remove four slide rod screws (2, fig. 21) and lock washers (3).
- (3) Remove two slide rods (1) on which valve head table moves.
- (4) Remove cable clamp screw (5, fig. 22) and nut (7). Remove clamp (6) and cable (4).

c. Inspection and Repair. Check for worn, bent, or damaged parts. If screw heads are worn or stripped, replace.

d. Reassembly.

- (1) Replace two slide rods (1, fig. 21).
- (2) Replace and tighten two slide rod brackets (3, fig. 22), screws (1), and washers (2).
- (3) Replace and tighten two slide rod screws (2, fig. 21) and lock washers (3).
- (4) Replace cable (4, fig. 22), clamp (6), clamp screw (5), and nut (7). Tighten the nut.

59. Wheel Head Cross Slide

a. General. The wheel head cross slide enables the grinding head assembly to move forward to the work and back away from it. It is actuated by the feed screw handle.

b. Removal and Disassembly.

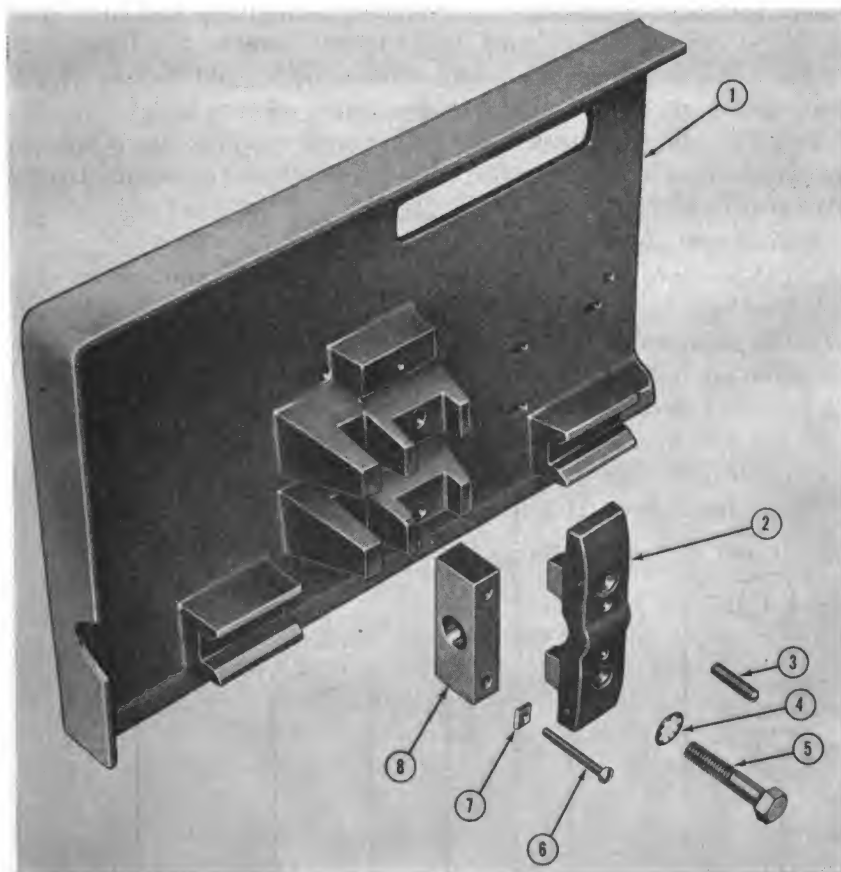
- (1) Remove rod clamp assembly screws (5, fig. 24) and washers (4). Remove rod clamp assembly set screws (3) and remove slide rod clamp (2).
- (2) Remove four slide rod screws (2, fig. 21) and lock washers (3). Remove two slide rods (1).
- (3) Remove feed screw assembly (par. 55*b*), then remove feed screw support block screws (6, fig. 24) and nuts (7) from support block (8).
- (4) Remove feed screw support block.

c. Inspection and Repair.

- (1) Check all parts for bending or breaking.
- (2) Check all threads. If worn or stripped, replace.

d. Reassembly.

- (1) Replace feed screw nut (8) and secure in place with two feed screw support block screws (6) and nuts (7).



- | | |
|--------------------------------------|----------------------------------|
| 1 Wheel head cross slide | 5 Slide rod clamp assembly screw |
| 2 Slide rod clamp | 6 Feed screw support block screw |
| 3 Slide rod clamp assembly set screw | 7 Feed screw support block nut |
| 4 Slide rod clamp assembly washer | 8 Feed screw support block |

Figure 24. Wheel head cross slide.

- (2) Replace feed screw (par. 55d).
- (3) Replace two slide rods (1, fig. 21). Replace and tighten four slide rod screws (2) and lock washers.
- (4) Replace rod clamp (2, fig. 24) and secure in place with two rod clamp assembly screws (5) and washers (4) and rod clamp assembly set screws.

60. Electrical System (fig. 25)

a. General. The electrical system for the Thor Model 100 grinder is relatively simple. There is an insulated, 3-wire plug-in cord that connects the unit to the power source. The input lead

enters the back of the base, is grounded to the base, and then goes to the stop-start switch and leads from there to the lamp connection, the grinding head motor receptacle, and to the chuck head motor receptacle. On the underside of the base assembly, a lead runs to the chuck head motor and supplies the power to the chuck head motor stop-start switch which works automatically with shifter lever.

b. Removal and Disassembly.

- (1) Remove any receptacle wire by loosening the screws that hold the leads in place.
- (2) Remove all plugs from the female receptacle.
- (3) To remove the start-stop switch, remove the two small screws on the front of the base and pull switch out.

c. Inspection and Repair.

- (1) Check each electrical lead for wear or for torn or frayed insulation. If worn or torn or frayed, replace.

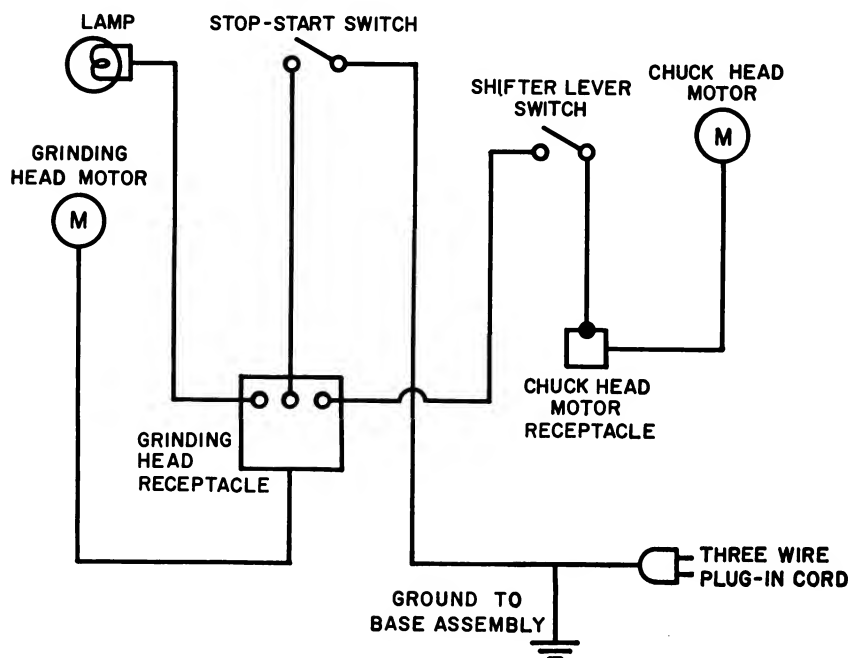


Figure 25. Wiring diagram.

- (2) Check each plug for broken lead connections and for badly burned or broken plugs. If burned or broken, replace.
- (3) Check each wire for evidence of arcing. Clean off discolored part, replace if necessary. If wire is annealed from heat or if it is brittle, replace whole lead.

d. Reassembly.

- (1) Connect leads (after they have been cleaned of insulation) to the connections from which they were removed.
- (2) Bend wire to fit posts or screws and tighten so they will not pull out when the unit is moved.

Section V. CHUCK HEAD MOTOR

61. General

The chuck head motor is located inside the chuck head and delivers power to the chuck through a gear train. It is rated at 1/30 hp and operates at 3,300 rpm. Manufactured by the Bodine Electric Company, it operates on 110-volts ac or dc.

62. Chuck Head Motor Removal and Disassembly (fig. 26)

- a.* Remove chuck assembly (par. 47).
- b.* To disassemble chuck head motor, proceed as follows:
 - (1) Remove housing cover screws (1) and remove housing cover (3) from housing. Remove motor screws (2) and remove motor from housing.
 - (2) Remove pinion gear set screw (8) and remove pinion gear (7) from rotor shaft (30).
 - (3) Remove spindle gear (4), idle gear (5), and idle gear shaft (6).
 - (4) Remove brush holder caps (28). This makes the brush and spring assembly (26) available for replacement. If old brushes are replaced, use them to mark the new brushes so the new brushes will be properly seated in the brush holders.
 - (5) Remove fillister head screws (29) and remove flange shields (12) and (19) by tapping lightly to break rabbeted fit.
 - (6) Remove armature (15) and remove ball bearings (13) and oil slinger (16).
 - (7) Remove fan assembly (14). Remove flange shield (19), tapping lightly to break fit.
 - (8) Remove fillister head screws (24) and unsolder field coil leads (17) from brush holders (27). Remove spacing washer (20).

63. Chuck Head Motor Inspection and Repair

a. Inspect the armature for evidence of wear. Inspect the coils, insulation, and soldered connections for electrical and mechanical conditions.

b. Check the armature coils for grounds, using a test probe consisting of a lamp in series with the two sharp pointed probes connected to a low-voltage d-c source. Touch one probe to the armature shaft and the other to each end of the commutator. Select a noninsulated point where the winding is soldered to the segment. If a coil or commutator segment is grounded, the lamp will light. If the ground is noticeable and accessible, it should be corrected; otherwise, replace or repair the armature.

c. Check the armature for internal short circuits with a growler by following the steps below.

- (1) Place the armature in a growler.
- (2) Rotate it slowly, while an iron knife, or other piece of light iron or steel, is held over the top of the revolving armature.
- (3) If a coil is shorted, the two slots in which the two sides of the shorted coil lie will attract the knife or steel.
- (4) If the coil is shorted, it must either be rewound or replaced.

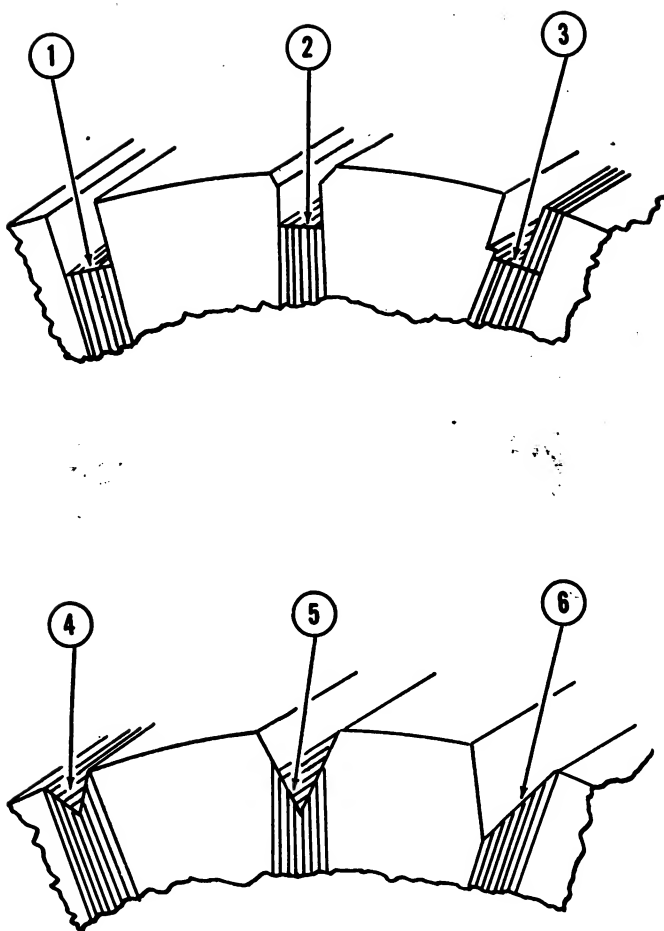
d. To check for open-circuited coils, follow the procedure outlined below.

- (1) While the armature is rotated in the growler, every pair of adjacent commutator bars should be shorted successively by the knife.
- (2) If the knife is in the same position while the armature is rotating, the same size spark should be obtained between every pair of bars.
- (3) If a coil is open, no spark will result.

e. Check the physical condition of the commutator for high mica, rough surfaces, and burned or pitted bars. See also if the commutator is out-of-round. If any of these physical defects exist, correct them according to the following procedures.

- (1) Center the armature on a lathe. Make sure it is concentric with the bearings.
- (2) Take light cuts over the entire commutator surface. When a smooth concentric surface is obtained, undercut the mica between the segments.
- (3) Support an undercutting tool on the tool rest and force it along the mica between the commutator segments. The tool which should be square and slightly wider than the mica is centered carefully so that a "fin" (3, fig. 27) is not left on the mica. Remove rough edges (1) by

- Figure 26. Chuck head motor.**



- | | | |
|----------------------|---------|---------------|
| 1 Rough edge | 3 Fin | 5 V-cut bevel |
| 2 Straight-cut bevel | 4 V-cut | 6 Fin |

Figure 27. Undercutting the commutator.

beveling as in (2). If it is necessary to use a three-cornered file or a "V" undercutting tool, it too should be slightly wider than the mica in order to make the required bevel. Continue to undercut and center tool carefully to avoid a "fin" (4) or (6). The finished cut should resemble (2) or (5) depending on the type of tool used.

- (4) Polish the commutator after the bars are machined and mica undercut. Use a commutator polishing stone or several layers of canvas or duck attached to a piece of wood. Hold pad or stone against surface until a high polish is obtained.

(5) With the armature shaft centered on a lathe, take a series of light cuts until collector rings are clean and free of pitting or turn marks. Polish with canvas or duck.

f. Examine bearings for wear or damage. Test them for free rolling action by hand. If rough, loose, or sticking, press out defective bearings and replace with a new part. If bearing is defective, replace.

g. To clean bearing, wipe all dirt from the exterior using a clean cloth moistened with light engine oil. Never use carbon tetrachloride or dry-cleaning solvents.

h. Check brushes and springs for wear or damage. Replace worn brushes, being careful to mark the new brushes so they will seat properly.

i. Inspect the plug-in cord to see that it is not damaged or frayed.

j. Check the field coil for grounds using test probes. Touch one probe to the field terminal and the other to an unpainted part of the housing. If the field is grounded the lamp will light.

k. Check field coil for open circuits or hidden breaks by placing the probes in series with the coil. The lamp will light if the coil is in good condition.

64. Chuck Head Motor Reassembly

a. Solder field coil leads (17, fig. 26) to brush holders (27). Replace spring washer and fillister head screws (24).

b. Replace ball bearing (13) and oil slinger. Replace fan assembly and another ball bearing. Replace armature.

c. Replace shields (12) and (19). Tap lightly with mallet to snap them in position. Replace fillister head screws (29).

d. Replace brush and spring assemblies (26). Replace brush holder caps (28).

e. Replace idle gear shaft (6), idle gear (5), and spindle (4).

f. Replace pinion gear (7) on shaft and tighten set screw (8).

g. Replace motor screws (2) and put motor in housing (23). Replace housing cover (3) and fasten with housing cover screws (1).

h. Reassemble chuck and head assembly (par. 49).

Section VI. GRINDING HEAD MOTOR

65. General

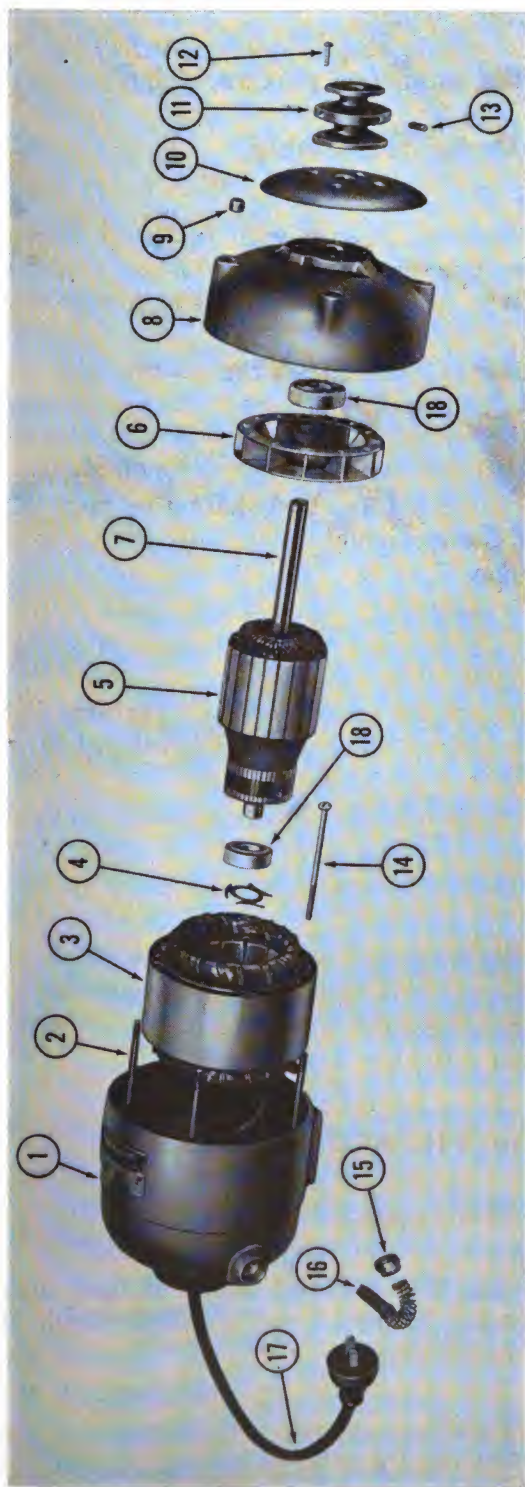
The grinding head motor, located at the rear of the grinding head assembly, is rated at $1/3$ hp, operates at 6,000 rpm, and uses a V-belt drive to deliver power to the grinding head. It is a universal motor operating at 110-V ac or dc and is manufactured by the Lamb Electric Company.

66. Grinding Head Motor Removal and Disassembly (fig. 28)

- a. Remove pulley set screw (13), then the double groove drive pulley (11).
- b. Remove splash guard (10) by removing four round head screws (12).
- c. Remove brush holder screw caps (15). Remove brush and spring assemblies (16) taking care to mark the brushes so they can be replaced as originally assembled.
- d. Remove four nuts (9) and slide fan-end bracket (8) from studs (2).
- e. Remove armature assembly (5), ventilating fan (6), and shaft as a unit. Remove ball bearings (18).
- f. Remove field (3) by removing two field clamping screws (14).

67. Grinding Head Motor Inspection and Repair

- a. Inspect brushes. If worn to within one-fourth inch of spring pilot, they should be replaced.
- b. Check armature for shorts and ground by means of a growler (par. 63c), a high voltage potential, 1,100 volts is satisfactory, and as stated in paragraph 63b. The armature winding resistance across diametrically opposite commutator segments should be 0.670 ohms plus or minus 0.034 ohms.
- c. If commutator brush path is worn in excess of $1/32$ inch depth, refinish commutator by machining, then undercut commutator mica (par. 63e) to a depth of $1/32$ inch. Give commutator surface a final finish and polish.
- d. Check the field for shorts and grounds as in paragraph 63j and k by means of a voltmeter, wattmeter, high-voltage potential, and Wheatstone bridge. The resistance of each pole of the field should be 0.860 ohms plus or minus 0.043 ohms. The input watts to each pole at low voltage should be approximately equal.



- 1 Housing
- 2 Stud
- 3 Field
- 4 Ball bearing spring washer
- 5 Armature assembly
- 6 Ventilating fan
- 7 Shaft
- 8 Fan end bracket
- 9 Nut
- 10 Splash guard
- 11 Pulley
- 12 Splash guard screws
- 13 Pulley set screw
- 14 Field clamping screws
- 15 Brush holder cap
- 16 Brush and spring assembly
- 17 Cord and plug assembly
- 18 Ball bearings

Figure 28. Grinding head motor.

e. Inspect ball bearings. Replace if they are chipped or scored or if armature does not rotate smoothly when turned by hand. Follow also the procedure outlined in paragraph 63g.

68. Grinding Head Motor Reassembly

(fig. 28)

a. Replace field in housing. Secure with two field clamping screws (14). Make sure that the live leads and brush holder will clear the commutator and other moving parts of the armature assembly.

b. Place spring washer (4) in place in the bearing hub recess of the commutator-end bracket. The prongs of the spring washer should press against the outer race of the commutator-end ball bearing. Replace fan (6) and ball bearings (18) on shaft.

c. Replace armature assembly, fan and shaft as a unit. Make sure the outer race of the commutator-end ball bearing presses against the spring washer.

d. Replace fan-end bracket (8) and fasten in place with four nuts (9). Rotate shaft (7) by hand to make sure armature turns smoothly and ball bearings are in alinement.

e. Replace brush and spring assemblies (16) in exactly the same position as before disassembly. Replace brush holder caps (15).

f. Test motor with any standard military testing equipment that is available.

g. Replace splash guard (10) and secure in place with four screws (12).

h. Replace drive pulley (11) and secure with set screw (13).

i. To tighten belt, loosen four screws holding motor to base, slide motor back along elongated slots until there is sufficient tension in the belt, then retighten four screws.

Section VII. ACCESSORIES

69. Diamond Bracket

(fig. 29)

a. *General.* The bracket and diamond holder is used to hold the diamond while dressing the chuck end grinding wheel. It is bolted to the valve head table.

b. *Disassembly.*

(1) Loosen set screw (1).

(2) Remove diamond (2) (in plug).



1 Set screw

2 Diamond (in plug)

3 Diamond bracket

Figure 29. Diamond bracket.

c. Inspection and Repair.

- (1) Check set screw threads. If worn or stripped, replace.
- (2) Check bracket for cracks and alinement. If out of line or damaged, replace bracket.
- (3) Inspect diamond for chipping or looseness. If defective beyond repair or regrinding, replace.

d. Reassembly.

- (1) Replace diamond (2) (in plug).
- (2) Tighten set screw (1).

- (3) If chuck head wheel is to be dressed, replace bracket on valve head table (par. 12b).

70. Depth Gage

(fig. 30)

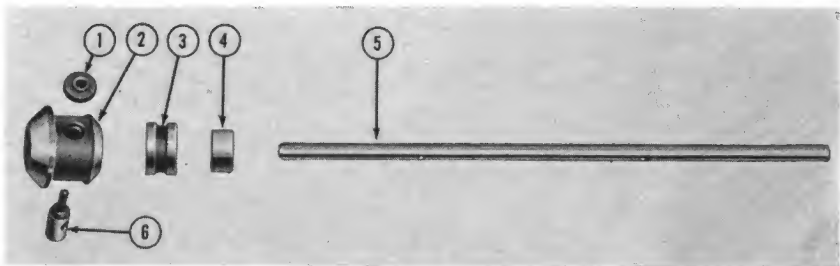
a. *General.* The depth gage is used to obtain the correct grinding setting for valve stem ends.

b. *Disassembly.*

- (1) Loosen set screws in both pilots (3) and (4) and slide off rod (5).
- (2) Loosen knurled nut and slide locating body (2) off rod.
- (3) Unscrew knurled nut and clamping studs (6) from locating body.

c. *Inspection and Repair.*

- (1) Check rod alinement. If out of line, replace.
- (2) Inspect all threads. If worn or stripped, replace.
- (3) Check faces of locating body for cracks or wear. If defective, they should be replaced.



- | | | |
|-----------------|-----------------------|-----------------|
| 1 Knurled nut | 3 Pilot, 1 1/2 inches | 5 Rod |
| 2 Locating body | 4 Pilot, 0.850 inch | 6 Clamping stud |

Figure 30. Depth gage.

d. *Reassembly.*

- (1) Insert clamping stud (6) on locating body. Screw knurled nut loosely on end of clamping rod.
- (2) Slide locating body on rod.
- (3) Slide both pilots on the rod and tighten set screws.

71. Rocker Arm Grinding Attachment

a. *General.* The attachment pin (3, fig. 7) of the rocker arm grinding attachments fits in the drilled hole (5, fig. 5) in the butt grinding attachment. Rocker arms are held in position between the cone shaped washers (3, fig. 31) and ground to desired tolerances.

b. Disassembly (fig. 31).

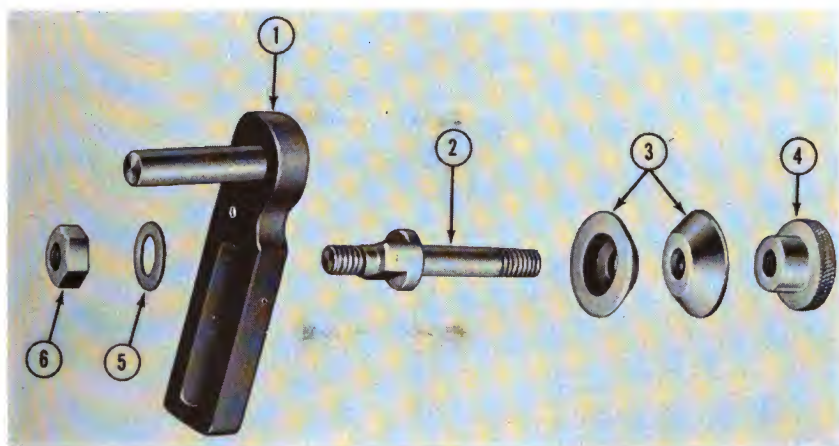
- (1) Unscrew nut (6) and remove washer (5).
- (2) Remove stud (2) from plate (1).
- (3) Unscrew knurled nut (4) and remove cone washers (3).

c. Inspection and Repair.

- (1) Inspect all threads. If worn or stripped, replace the unit.
- (2) Check plate and pin for alinement. If out of line, realine or replace.

d. Reassembly (fig. 31).

- (1) Place bottom of stud (2) through slot in plate (1).
- (2) Replace washer (5) and tighten nut (6).
- (3) Replace cone washers (3) and tighten with knurled nut (4).



1 Plate	3 Cone washer	5 Washer
2 Stud	4 Knurled nut	6 Nut

Figure 31. Rocker arm grinding attachment.

72. Butt Grinding Attachment

a. General. The butt grinding attachment is designed to grind valve stem ends to within 0.001 of an inch. It is also used to hold the rocker arm grinding attachment (par. 71a) and the V-block. The butt grinding attachment is usually attached to the grinder, but can be removed if necessary.

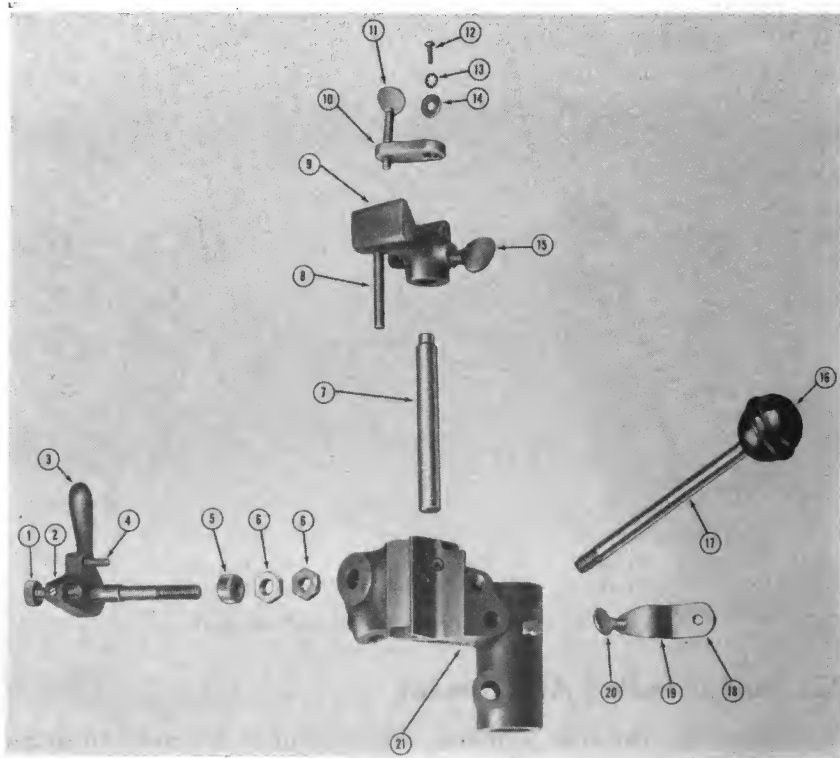
d. Disassembly.

- (1) Unloosen three allen head set screws near micrometer feed nut (3, fig. 10).
- (2) Remove swivel clamp assembly (3, fig. 32) with stop pin from the attachment by unloosening the lock nuts (6) at the bottom of the assembly.

- (3) Remove V-block (9) if attached.
- (4) Remove micrometer feed nut from its spindle, then remove the butt grinding attachment.

c. Inspection and Repair.

- (1) Inspect all threads on the allen head screws and the swivel clamp. If worn or damaged badly, replace. Try rethreading if not worn too badly.
- (2) Check swivel clamp (3) for cracks or damage. Check stop pin also for cracks and looseness. Replace as a unit if damaged.



- | | |
|------------------------------------|-------------------------------------|
| 1 Swivel clamp knurled screw | 12 Swivel clamp screw (Ford) |
| 2 Swivel clamp set screw | 13 Swivel clamp lock washer (Ford) |
| 3 Swivel clamp assembly | 14 Swivel clamp screw washer (Ford) |
| 4 Swivel clamp stop pin | 15 V-stop thumb screw |
| 5 Swivel clamp stud sleeve | 16 Ball knob |
| 6 Swivel jam nut | 17 V-block arm handle |
| 7 V-stop stud bar | 18 Tappet clamp pin |
| 8 V-stop stud | 19 Tappet clamp |
| 9 V-stop assembly | 20 Tappet thumb screw |
| 10 Swivel clamp (Ford) | 21 V-block arm |
| 11 Swivel clamp thumb screw (Ford) | |

Figure 32. Butt grinding attachment.

- (3) Check butt grinding attachment itself for cracks or signs of wear.
- (4) Check handle (17) for looseness and the ball knob (16) on the top. If knob is cracked or broken, replace it.
- (5) Inspect micrometer feed nut for legibility. Check it also for cracks and out-of-round.

d. Reassembly.

- (1) Replace butt grinding attachment on its base and replace the micrometer feed nut on its spindle.
- (2) Tighten the three allen head set screws.
- (3) Replace swivel clamp assembly and tighten lock nuts.
- (4) Install V-block if necessary.

73. Dressing Diamond

a. General (fig. 6). The dressing diamond, when clamped in position on the butt grinding attachment or bracket and diamond holder, is used to dress the grinding wheels.

b. Disassembly.

- (1) The dressing diamond comes assembled in the plug (2, fig. 29).
- (2) Remove stud from bracket (par. 69b).

c. Inspection and Repair.

- (1) Inspect diamond for chips or excessive wear. If chipped or worn, replace.
- (2) If replacements are unavailable, turn diamond to bring a new face in contact with the grinding wheel.

d. Reassembly.

Reassemble diamond (par. 69d).

Section VIII. ENGINEERING INFORMATION

74. General

The following data is presented for the information and guidance of maintenance personnel responsible for third and high echelon maintenance of this grinder.

75. Clearances and Tolerances

a. Minimum and Maximum Stem Diameter Capacity.

- (1) Standard collet $\frac{9}{32}$ inch to $\frac{9}{16}$ inch.
- (2) Optional collet $\frac{1}{2}$ inch to $1\frac{1}{16}$ inch.

b. Grinding Wheel Bearings.

- (1) Chuck end : SKF-1204J, self alining

Outside diameter.....1.8504 inches.

Width.....0.5512 inch.

Bore.....0.7874 inch.

- (2) Butt end.....Same as chuck end.

- (3) Motor ends..... $\frac{1}{2}$ -inch bronze bushings.

- (a) Commutator: ND87013.

Outside diameter.....1.2598 inches.

Width, inner race.....0.500 inch.

Width, outer race.....0.394.

Bore.....0.5118 inch.

- (b) Fan: ND87502

Outside diameter.....1.3780 inches.

Width, inner race.....0.500 inch.

Width, outer race.....0.433 inch.

Bore.....0.5906 inch.

c. Valve Head Spindle. Allowable runout of spindle is 0.002 inch, total indicator reading.

- (1) Clearance, valve head spindle to bearings is 0.0002 to 0.0008 inch. Bearings should be replaced when clearance exceeds 0.002 inch.

- (2) End play, valve head spindle. None at all. Remove end play with spindle collar.

d. Butt Grinder Spindle Clearance. Normal is 0.001 to 0.002 inch. Allowable wear is 0.004 inch.

e. Grinding Wheels.

- (1) *Chuck end.* Four inches in diameter when new. Replace when dressed down to 3 inches.

- (2) *Butt end.* $1\frac{1}{8}$ inches wide when new. Replace when dressed down to $\frac{5}{8}$ inches.

f. Angular Play in Shifter Lever. None, adjust with knurled nut for cable take-up.

g. Vertical Play in Valve Head Slide (Clearance Between Rod Seat and Clamp). None, adjust with clamp and bolts (1, fig. 22).

h. Vertical Play in Wheel Head Slide. None, adjust with screws (3, fig. 24).

i. End Play in Feed Screw. None, pull nuts (4, fig. 21) up tight to remove end play.

j. Thread Clearance, Feed Screw. Adjustable with screw (6, fig. 24).

CHAPTER 5

SHIPMENT AND LIMITED STORAGE AND DEMOLITION TO PREVENT ENEMY USE

Section I. LIMITED STORAGE AND SHIPMENT

76. Limited Storage

a. Inspection. Perform all procedures given in organizational maintenance (par. 26).

b. Cleaning and Painting.

- (1) Clean grinder and accessories with dry-cleaning solvent and clean cloth.
- (2) Paint all areas where paint has deteriorated or been removed.

c. Complete Lubrication. Lubricate the grinder as specified in LO 5-4193.

d. Proposed Processing to Prevent Corrosion.

- (1) Coat all exposed polished surfaces with rust preventive compound.
- (2) Coat all internal surfaces of coolant assembly with a preservative by placing it in coolant tank. Operate grinder for about 15 minutes, then pump preservative from grinder.
- (3) Store in cool dry place.

77. Domestic Shipment

a. General. Prepare the grinder the same way as for limited storage (par. 76).

b. Wrap all accessories in waxed paper and pack in an excelsior filled wooden box.

c. Remove lamp from reflector and pull lamp inner sleeve (17, fig. 20) off outer sleeve (18, fig. 20). Place lamp assembly between chuck and grinding head assembly.

d. Place grinder in solid wooden box and clamp to bottom. Place accessories in same box as grinder. Strap box with metal straps.

Section II. DEMOLITION OF GRINDER TO PREVENT ENEMY USE

78. General

When capture or the abandonment of the grinder to an enemy is imminent, the responsible unit commander makes the decision either to destroy the equipment or to render it inoperative. Based on this decision orders are issued which cover the desired extent of destruction. Whatever method of demolition is employed, it is essential to destroy the same vital parts of all grinders and all corresponding repair parts.

79. Preferred Demolition Methods

Explosives or mechanical means, either alone or in combination, are the most effective methods of demolition to employ. Listed below are the vital parts in order of priority of demolition for each preferred method.

a. Demolition by Explosives. Place as many of the following charges as the situation permits and detonate them simultaneously with detonating cord and a suitable detonator:

- (1) A 1-pound charge against the grinding head assembly and the grinding head motor.
- (2) A 1½-pound charge against the chuck and head assembly.

b. Demolition by Mechanical Means. Use sledge hammers, crowbars, picks, axes, or any other heavy tools which may be available, to destroy the following:

- (1) Grinding head assembly.
- (2) Grinding head motor.
- (3) Chuck and head assembly.
- (4) Coolant pump.
- (5) All hoses and V-belts.

80. Other Demolition Methods

If the situation prevents using either of the preferred methods of demolition, use the following methods, either singly or in combination.

a. Demolition by Weapons Fire. Fire on the grinder with the heaviest weapons available.

b. Demolition by Scattering and Concealing. Remove the grinding head assembly, chuck and head assembly, butt grinding attachment, coolant pump, coolant hoses and spouts, V-belts, and

all accessories. Scatter them through dense foliage, bury them in dirt or sand, or throw them in a lake, stream, or other body of water.

c. Demolition by Burning. Pack rags, clothing, or canvas around and under the grinder. Saturate this with gasoline, oil, or some other inflammable liquid and ignite.

d. Demolition by Submersion. Totally submerge the grinder in a body of water to afford concealment. Some water damage may be caused, especially by salt water.

e. Demolition by Misuse. Perform the steps listed below to make the unit inoperative.

- (1) Place sand, dirt, or metal scraps in the oiling points, coolant tank, grinding head assembly, grinding head motor, and chuck and head assembly.
- (2) Start the grinder and the chuck and head assembly.
- (3) Run the grinder at full speed until failure occurs.

81. Training

All operators should receive thorough training in the destruction of the grinder. Simulated destruction, using all the methods listed above, should be included in the operator training program. It must be emphasized in training that demolition operations are usually necessitated by critical situations when the time available for destruction is limited. For this reason, it is necessary that operators be thoroughly familiar with all methods of destruction and be able to carry out demolition instructions without reference to this or to any other manual.

APPENDIX I

REFERENCES

1. Dictionaries of Terms and Abbreviations

- SR 320-5-1 Dictionary of U.S. Army Terms.
SR 320-50-1 List of Authorized Abbreviations.

2. Lubrication and Painting

- LO 5-4193 Lubrication Order.
TM 9-2851 Painting Instructions for Field Use.

3. Preparation for Export Shipment

- TB 5-9711-1 Preparation of Corps of Engineers Equipment for Overseas Shipment.
TB 5-9713-1 Preparation for Export, Spare Parts for Corps of Engineers Equipment.

4. Preventive Maintenance

- TB 5-4193-1 Preventive Maintenance Service.

5. Publication Indexes

- SR 110-1-1 Index of Army Motion Pictures and Film Strips.
SR 310-20-3 Index of Army Training Publications.
SR 310-20-4 Index of Technical Manuals, Technical Regulations, Technical Bulletins, Supply Bulletins, Lubrication Orders, and Modification Work Orders.
SR 310-20-4 Index of Technical Manuals and Bulletins.
SR 310-20-5 Index of Administrative Publications.
SR 310-20-6 Index of Blank Forms.

6. Training Aids

- FM 21-8 Military Training Aids.

APPENDIX II **IDENTIFICATION OF REPLACEABLE PARTS**

Fig. No.	Index No.	Engineer stock No.		Manufacturer's part No.		Federal supply class and item identification No.	Description	Quantity per unit
		Code No.	Part No.	Code No.	Part No.			
18	1	*752	76024				ROD, stop	1
18	2	*752	76024				CAP SCREW, cover plate	1
18	3	*752	76028				PLATE, cover	1
18	4	*752	76027				SLEEVE, outer	1
18	5	*752	76026				SLEEVE, inner	1
18	6	*752	76022				BUSHING, threaded	1
18	7	*752	76030				COLLAR, valve head spindle	1
18	8	*752	74507				COLLAR SCREW, valve head spindle	1
18	9	*752	74501				SLEEVE, collet	1
18	10	*752	77843				COLLET	1
18	11	*752	74454				HOUSING, valve head	1
18	12	*752	74517				SPINDLE	1
19	1	*752	74457				SLIDE, valve head	1
19	2	*752	74605				NUT, valve head clamp	1
19	3	*752	74667				NUT, diamond bracket stud	1
19	4	*752	74461				WASHER, diamond bracket stud	1
19	5	*752	74461				STUD, diamond bracket	1
19	6	*752	74460				STUD, valve head	1
19	7	*752	74458				CUP OIL, valve head slide	3
20	1	*752	74591				NUT, (left-hand), grinding wheel	1

Fig. No.	Index No.	Engineer stock No.		Manufacturer's part No.		Federal supply class and item identification No.	Description	Quantity per unit
		Code No.	Part No.	Code No.	Part No.			
20	2	*752	74593				WASHER, grinding wheel	2
20	3	*752	73534				WHEEL, grinding offset	1
20	4	*752	74573				GUARD, wheel (left-hand)	1
20	5	*752	74467				SCREW, guard shaft	2
20	6	*752	74575				NUT, clamp; coolant spout	1
20	7	*752	74574				SPOUT, coolant (left-hand)	1
20	8	*752	74569				VALVE, needle	2
20	9	*752	74520				SHAFT, wheel guard (left-hand)	1
20	10	*752	74563				COLLAR, driving	1
20	11	*752	74564				NUT, clamp; ball bearing	1
20	12	*752	74565				BEARING, ball	2
20	13	*752	74562				SPINDLE	1
20	14	*752	74463				HOUSING ASSEMBLY, wheel head	1
20	15	*752	74474				REFLECTOR, lamp	1
20	16	*752	74473				BODY, lamp	1
20	17	*752	74470				SLEEVE, inner; lamp swivel	1
20	18	*752	74468				SLEEVE, outer; lamp swivel	1
20	19	*752	73589				PULLEY, spindle	1
20	20	*752	74631				V-BELT, wheel head	1
20	21	*752	74590				NUT, spindle pulley	1
20	22	*752	74572				GUARD, wheel (right-hand)	1
20	23	*752	74646				WASHER, guard (right-hand)	2
20	24	*752	74546				SCREW, guard (right-hand)	2
20	25	*752	74570				SPOUT, coolant (right-hand)	1
20	26	*752	73533				WHEEL, cup grinding	1

20	27	*752	74592			NUT, grinding wheel (right-hand)	1
20	28	*752	63401			HEAD SCREW, grinding wheel	4
20	29	*752	74645			WASHER, grinding wheel head screw	4
20	30	*752	74608			PAN, drain	1
20	31	*752	74462			KEY, pulley	1
21	1	*752	74450			ROD, slide	4
21	2	*752	58652			SCREW, slide rod	8
21	3	*752	43-9533.-	15009	010.3320	WASHER, lock	8
			500.033				
21	4	*752	74626			LOCK NUT, feed screw	2
21	5	*752	76922			WASHER, thrust	2
21	6	*752	66915			BEARING, thrust	1
21	7	*752	74449			BASE	1
21	8	*752	74609			SCREEN, coolant tank	1
21	9	*752	74625			SCREW, feed	1
21	10	*752	76919			SLEEVE, feed screw	1
21	11	*752	76921			WASHER, thrust	2
21	12	*752	71944			BEARING, thrust	1
21	13	*752	76920			WASHER, cup	1
21	14	*752	58330			WASHER, spring	1
21	15	*752	74620			HANDLE, feed screw	1
21	16	*752	74621			WASHER, feed screw handle	1
21	17	*752	74622			SCREW, feed screw handle	1
21	18	*752	74613			PULLEY, shifter	1
21	19	*752	74586			SHAFT, shifter	1
21	20	*752	74587			SCREW, stop arm	2
21	21	*752	74588			NUT, stop arm screw	2
21	22	*752	74646			WASHER, shifter lever	2
21	23	*752	74611			COLLAR, shifter shaft	1
21	24	*752	74546			SCREW, shifter lever	1
21	25	*752	74545			LEVER, shifter	1

Fig. No.	Index No.	Engineer stock No.		Manufacturer's part No.		Federal supply class and item identification No.	Description	Quantity per unit
		Code No.	Part No.	Code No.	Part No.			
21	26	*752	74528				KNOB, shifter lever	1
21	27	*752	74613				SET SCREW, shifter pulley	1
21	28	*752	74612				LUG, shifter pulley clamping	1
21	29	*752	74610				SCREW, shifter pulley clamping lug	2
21	30	*752	74619				NUT, stop stud	1
21	31	*752	74576				ASSEMBLY, stop stud	1
21	32	*752	25072				SCREW, right roller bracket	2
21	33	*752	74579				ASSEMBLY, right roller bracket	1
22	1	*752	74450				SCREW, slide rod bracket	2
22	2	*752	74450				WASHER, slide rod bracket	2
22	3	*752	74450				BRACKET, slide rod	2
22	4	*752	74618				CABLE, shifter	1
22	5	*752	74616				SCREW, cable clamp	1
22	6	*752	74614				CLAMP, cable	1
22	7	*752	74615				NUT, cable clamp	1
22	8	*752	74457				SLIDE, valve head	1
22	9	*752	74605				NUT, valve head clamp	1
23	1	*752	74491				HOSE, outlet	1
23	2	*752	74490				HOSE, inlet	1
23	3	*752	74630				V-BELT	1
23	4	*752	74479				ASSEMBLY, pump	1
23	5	*752	74484				HOUSING, pump inlet	1
23	6	*752	74483				HOUSING, pump outlet	1
23	7	*752	63400				KEY, swivel stud cotter	1
23	8	*752	74451				STUD, pump swivel	1

1	SLIDE, wheel head cross	1
1	CLAMP, slide rod	1
2	SET SCREW, slide rod clamp assembly	2
2	WASHER, slide rod clamp assembly	2
2	SCREW, slide rod clamp assembly	2
2	SCREW, feed screw support block	2
2	NUT, feed screw nut assembly	2
1	BLOCK, feed screw support	1
5	SCREW, machine	5
4	SCREW, motor	4
1	COVER, housing	1
1	GEAR, spindle	1
1	GEAR, idler	1
1	SHAFT, idler	1
1	GEAR, pinion	1
1	SET SCREW, pinion gear	1
2	END PLATE, ball bearing	2
1	WASHER, felt	1
1	WASHER, felt retaining, ventilator motor	1
1	SHIELD, flange	1
2	ASSEMBLY, ball bearing	2
1	FAN ASSEMBLY	1
1	ARMATURE	1
1	SLINGER, oil	1
2	COIL, field	2
1	RING, field	1
1	SHIELD, flange	1
2	WASHERS, spacing	2
1	WASHER, felt retainer	1

24	74475	*752	1
24	74632	*752	2
24	74632	*752	3
24	74632	*752	4
24	74632	*752	5
24	74558	*752	6
24	74559	*752	7
24	74557	*752	8
26	43-7413.- 030.060	*752	1
26	74512	*752	2
26	74494	*752	3
26	74502	*752	4
26	74503	*752	5
26	74504	*752	6
26	74510	*752	7
26	74606	*752	8
26	N-164	339	9
26	N-165	339	10
26	N-166	339	11
26	N-1992	339	12
26	N-2207LG- 11	339	13
26	N-1168	339	14
26	N-525	339	15
26	3053-6-1	339	16
26	N-519	339	17
26	N-651	339	18
26	N-481	339	19
26	N-162	339	20
26	N-766	339	21

Fig. No.	Index No.	Engineer stock No.		Manufacturer's part No.		Federal supply class and item identification No.	Description	Quantity per unit
		Code No.	Part No.	Code No.	Part No.			
26	22	*752	74547				CORD, plug-in	1
26	23	*752	74454				HOUSING, valve head	1
26	24	*752	3-364				SCREW, fillister head	4
26	25	339	N-198				SCREW, end plate: ventilator motor	8
26	26	339	V-116				BRUSH and spring assembly	2
26	27	339	C450				HOLDER, brush	2
26	28	339	C-451				CAP, brush holder	2
26	29	339	2236-22				SCREW, fillister head	4
26	30	339	74562				SHAFT, rotor	1
26	31	339	N-766				WASHER, felt	1
28	1	339					HOUSING	1
28	2	339					STUD	4
28	3	339	27013-A				FIELD	1
28	4	339	5838				WASHER, ball bearing spring	1
28	5	339	32281-A				ARMATURE assembly	1
28	9	339					FAN, ventilating	1
28	7	339					SHAFT	1
28	8	339					BRACKET, fan end	1
28	9	339					NUT	4
28	10	339	10-3760				GUARD, splash	1
28	11	339					PULLEY	1
28	12	339	7833				SCREWS, splash guard	4
28	13	339					SCREW, set, pulley	1
28	14	339					SCREW, field clamping	2
28	15	339	34000-A				CAP, brush holder	2

28	16	339	35096-A	BRUSH, and spring assembly	2
28	17	339	36057-A	CORD and plug assembly	1
28	18	339		BEARINGS, ball	2
29	1	*752	74467	SCREW set	1
29	2	*752	74448	DIAMOND (in plug)	1
29	3	*752	74607	BRACKET, diamond	1
30	1	*752	74664	NUT, knurled	1
30	2	*752	74659	BODY, locating	1
30	3	*752	74660	PILOT, 1½ inch	1
30	4	*752	74661	PILOT, 0.850 inch	1
30	5	*752	74662	ROD	1
30	6	*752	74663	STUD, clamping	1
31	1	*752	74538	PLATE	1
31	2	*752	74540	STUD	1
31	3	*752	74541	WASHER, cone	2
31	4	*752	74529	NUT, knurled	1
31	5	*752	74650	WASHER	1
31	6	*752	74542	NUT	1
32	1	*752	74536	SCREW, swivel clamp knurled	1
32	2	*752	74527	SCREW, set, swivel clamp	1
32	3	*752	74521	SWIVEL clamp assembly	1
32	4	*752	74522	PIN, stop, swivel clamp	1
32	5	*752	74530	SLEEVE, swivel clamp stud	1
32	6	*752	74531	NUT, jam, sleeve	2
32	7	*752	74533	BAR, v-stop stud	1
32	8	*752	74524	STUD, v-stop	1
32	9	*752	74523	V-STOP, assembly	1
32	10	*752	74602	CLAMP, swivel (Ford)	1
32	11	*752	74603	SCREW, thumb, swivel clamp (Ford)	1
32	12	*752	24004	SCREW swivel clamp (Ford)	1
32	13	*752	24003	WASHER, lock, swivel clamp (Ford)	1

Fig. No.	Index No.	Engineer stock No.		Manufacturer's part No.		Federal supply class and item identification No.	Description	Quantity per unit
		Code No.	Part No.	Code No.	Part No.			
32	14	*752	74486				WASHER swivel clamp screw (Ford)	1
32	15	*752	74525				SCREW, thumb v-stop	1
32	16	*752	74528				KNOB, ball	1
32	17	*752	74532				HANDLE, v-block arm	1
32	18	*752	74583				CLAMP, tappet pin	1
32	19	*752	74582				CLAMP, tappet	1
32	20	*752	74603				SCREW, thumb tappet	1
32	21	*752	74526				ARM, v-block	1

♦ Nonstocked items.

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